ELECTRONIC DATA INTERCHANGE

INPUT

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ELECTRONIC DATA INTERCHANGE

ELECTRONIC DATA INTERCHANGE

ABSTRACT

Electronic Data Interchange (EDI) is the electronic transfer of business information between organizations in a structured application. Organizations may have different processors and data formats, in which case translation to and from a common format or standard is required. For market analysis purposes, this study focuses on third-party EDI services.

EDI offers economies in standard business transactions by reducing manual document preparation costs and by eliminating errors caused by rekeying information. Further, EDI information can be integrated with other applications for the generation of management reports and other purposes.

This report describes EDI activities in several industries and profiles nine EDI services and five EDI software vendors. It also analyzes issues affecting acceptance of EDI. Market forecasts and recommendations to industry participants are included.

This report contains 179 pages, including 30 exhibits.

ELECTRONIC DATA INTERCHANGE

CONTENTS

		Page
I	INTRODUCTION	1
	A. Background	1
	B. Methodology	3
	C. Scope	5
	D. Related INPUT Reports	5
II	EXECUTIVE SUMMARY	9
	A. What is EDI?	10
	B. Why Use EDI?	12
	C. Who Participates in the EDI Market?	14
	D. Exponential EDI Growth: A $1.5 Billion Market by 1990	16
	E. Central Recommendation: Build EDI Awareness	18
	F. EDI Recommendations: VANs	20
	G. EDI Recommendations: Remote Computing Services	22
	H. EDI Recommendations: Software Vendors	24
III	ELECTRONIC DATA INTERCHANGE: OVERVIEW	27
	A. Background	27
	1. Before EDI	27
	2. An Alternative Is Needed	30
	3. With EDI	33
	4. EDI History	34
	5. EDI Service Distinctions	34
	B. VAN Services	35
	C. Remote Computing Service Solutions	36
	D. Software Solutions	36
	E. Technology and Market Observations	38
	1. VANs Are Commodities and Need Differentiation	38
	2. Private Networks Are More Cost-Effective	40
	3. New Bell Operating Company Services	40
	4. Electronic Mail (E-Mail) Is Developing EDI Features	41
	5. New Communications Protocols Are Emerging	43
	a. MNP	43
	b. X.PC	44
IV	ISSUES AND FACTORS IN EDI	47
	A. EDI Standards	47
	B. Security	52
	C. Awareness	53

		Page
D.	Disparate Communications Networks	54
E.	Customization	55
F.	Terminals and Turnkey Systems	55
G.	Internal Changes	56
H.	Legality	57
I.	Human and Business Factors	57
1.	Human Relationships	57
2.	Attitude Factors	58
J.	EDI's Impact on the Paper Industry	59
K.	Banks Are Largely Missing from EDI	59
1.	Automated Clearinghouses	61
2.	Banks and International Trade	63
L.	Costs	64
1.	Network and Transaction Costs	64
2.	Start-Up Costs	64
3.	Who Pays?	65
4.	Who Controls?	65
V	ELECTRONIC DATA INTERCHANGE MARKETS AND STRATEGIES	67
A.	Industry Activities	67
1.	Discrete Manufacturing	67
a.	Automobile Manufacturing	67
b.	Electronics Industry	69
2.	Process Manufacturing	70
a.	Paper and Pulp Industry	70
b.	Iron and Steel Industry	73
3.	Transportation Industry	73
a.	Railroads	74
b.	Trucking	76
c.	Ocean Shipping	77
4.	Medical Industry	77
5.	Retail/Wholesale Distribution	78
a.	Grocery Industry	78
b.	Office Products	80
B.	Value Added Network Services	80
1.	McDonnell Douglas Corporation - EDI Net	81
2.	General Electric Information Services	83
a.	MarkNet	83
b.	National Electronic Information Corporation (NEIC)	85
c.	GEISCO's EMC Express	85
d.	Comments	86
3.	IBM - Information Network (IN)	86
4.	AT&T Information Systems Net 1000 Interchange Services	89
5.	Control Data Corporation's Redinet	91

		Page
C.	Other Remote Computing Service Companies	92
1.	Informatics General Corporation	92
2.	Kleinschmidt	94
3.	Railinc Corporation	95
4.	TranSettlements, Inc.	97
5.	Transnet	98
D.	EDI Software	100
1.	APL Group	100
2.	EDI, Inc.	102
3.	Metro Mark Integrated Systems	103
4.	Program Science Incorporated	103
5.	TDCC	105
E.	Market Observations	106
1.	EDI Creates Opportunities	106
2.	EDI Is Currently in Piloting Stage	107
F.	Market Share: VANs and RCS	107
G.	Market Share: Software	110
H.	Market Forecasts	110
1.	Overall Growth	110
2.	Aggregate Market Growth	112
3.	Industry Segment Growth Rates	112
4.	Transaction Growth and the "Cascade Effect"	112
5.	VANs Have the Most to Gain	115
6.	Small RCS Will Hold Niches	117
7.	Software Vendors Have Two Options	117
VI	MAJOR TRENDS AND OPPORTUNITIES, AND RECOMMENDATIONS	119
A.	International EDI	119
1.	User Needs/Market Requirements	119
2.	Regulatory Issues	120
3.	U.S. Information Services Companies Involved in International EDI	120
4.	International EDI Growth	122
5.	EDI in Other Countries	122
a.	Europe	122
b.	Canada	124
B.	The EDI Clearinghouse Concept	125
1.	Control Data Network Transfer Service	126
2.	AT&T	126
3.	Globenet	126
4.	Analysis	127
C.	Enhancements Help Third-Party Services	128
D.	Opportunities	129
E.	Recommendations	132
1.	Central Recommendation: Create Awareness	134
2.	Recommendations to Value Added Networks	136
3.	Recommendations to Small Remote Computing Services	138

		Page
	4. Recommendations to Software Vendors	140
	5. Recommendations to Proprietary EDI Systems Developers	143
VII	THE FUTURE OF EDI - CONCLUSIONS	149
	A. EDI Is Now Being Piloted	149
	B. Awareness Is Key	149
	C. The Potential Is Great	150
APPENDIX A:	EDI TERMS DEFINED	153
APPENDIX B:	EDI SERVICES AND SOFTWARE	157
	A. Value Added Network EDI Services	157
	1. Control Data Corporation - Redinet	157
	2. General Electric Information Services - MarkNet	158
	3. IBM - Information Network (IN)	159
	4. McDonnell Douglas Corporation - EDI Net	159
	B. EDI Service Bureaus	159
	1. Informatics General	159
	2. Kleinschmidt	160
	3. Railinc Corporation	160
	4. TranSettlements, Inc.	161
	C. EDI Software	162
	1. APL Group	162
	2. Metro Mark Integrated Systems	162
	3. Program Science Incorporated	163
	4. TDCC	163
APPENDIX C:	ELECTRONIC DATA INTERCHANGE USER QUESTIONNAIRE	165
APPENDIX D:	ELECTRONIC DATA INTERCHANGE VENDOR (VAN) QUESTIONNAIRE	173
APPENDIX E:	ELECTRONIC DATA INTERCHANGE VENDOR (SOFTWARE) QUESTIONNAIRE	177

EXHIBITS

			Page
II	-1	Electronic Data Interchange	11
	-2	Why Use EDI?	13
	-3	Who Participates in the EDI Market?	15
	-4	Exponential EDI Growth	17
	-5	Central Recommendation: Build EDI Awareness	19
	-6	EDI Recommendations: VANs	21
	-7	EDI Recommendations: Remote Computing Services	23
	-8	EDI Recommendations: Software Vendors	25
III	-1	Without EDI	29
	-2	Incompatible Equipment and Protocols	31
	-3	Numerous Participants	32
	-4	VAN/RCS Role in EDI	37
IV	-1	EDI Standard Relationships	50
	-2	Agencies and Associations Involved in EDI Standards	51
	-3	User EDI Concerns	60
V	-1	VAN/RCS EDI Services	99
	-2	Factors Impacting EDI	108
	-3	Current EDI Market Shares by Number of Users	109
	-4	Independent EDI Software Vendors	111
	-5	EDI Market Growth, 1985-1990	113
	-6	EDI Market Forecast Industry Segments, 1985-1990	114
	-7	EDI Transaction Growth, 1985-1990	116
VI	-1	Adding Value to Third-Party EDI Services	130
	-2	EDI Opportunities	133
	-3	Central Recommendation	135
	-4	VAN Recommendations	139
	-5	RCS Recommendations	141
	-6	Software Recommendations	144
	-7	Private Network Recommendations	147
VII	-1	EDI Conclusions	151

1 INTRODUCTION

I INTRODUCTION

A. BACKGROUND

- This report, produced by INPUT's Market Analysis and Planning Services program, examines Electronic Data Interchange (EDI) markets and trends.

- The topic was chosen because of high industry interest, illustrated by the high number of calls to INPUT's customer service "hotline" and by high attendance at industry EDI seminars.

- INPUT defines EDI as the electronic transfer of business information between organizations in a structured application. The organizations involved may have different computers, terminal types, protocols, and data formats.

- For market analysis purposes this study focuses on third-party EDI services.

- This report excludes consumer applications such as electronic shopping, Automatic Teller Machine (ATM) networks, point of sales (POS) terminals, and airline reservation systems which are considered captive networks used for transactions between two parties.

- The study also excludes private EDI systems (representing transactions without a third party) from the market analysis and forecast, as well as intra-company communications. However EDI applications can be used internally or between branch offices and corporate headquarters.

- The techniques of electronically transferring data representing standard business documents such as purchase orders and invoices between trading partners have been used for approximately 15 years. Large companies are able to require smaller, dependent suppliers to accept their defined formats.

- What's changing is that smaller companies are recognizing the benefits of electronic interchange, requiring the use of third-party network services, and that standard formats are starting to be used.

  - These formats may be an intermediate step in the transaction.

  - Data may be translated from one format to a standard, then translated again into the format recognized by a trading partner's computer.

  - This implies that universal acceptance of data format standards will eliminate the need for intermediate translations. While this may eventually happen, it is several years away.

- The largest current users of EDI are the automotive and transportation industries. The next wave of usage (which is already beginning) will be in grocery and consumer goods distribution (including warehousing), electronics, chemical, paper, office supplies, and drugs.

- The reasons for using EDI include the time value of information, cost avoidance, better inventory control, and the integration of EDI data and corporate information processing.

- EDI can be accomplished point-to-point on private networks by Remote Computing Services (RCS) or through Value Added Networks (VANs) which provide the necessary translations between dissimiliar processing systems and formats. They also serve as collection and routing points.

- Within the next five years it is expected that thousands of companies will abandon paper purchase orders, invoices, and other routine transactions and adopt EDI standards. However, the industry must further educate would-be users to the benefits of EDI.

- EDI is related to electronic mail, however, the simple messaging aspects of E-mail are not central to this study.

- Among the issues involved in EDI are standards, compatibility, security, appropriate technologies, transnational data communications, legal considerations, economic responsibilities, and the effects on current business practices.

- EDI efforts have been implemented based on private standards. New emerging standards, adapted to specific industries while having cross-industry importance, will pave the way for new information interchange applications. Accordingly, INPUT believes EDI is poised for significant growth, assuming a broad market recognizes its benefits.

- EDI is providing new lines of business for VANs, RCSs, software vendors and professional services companies. Opportunities remain to be exploited as usage is only beginning.

B. METHODOLOGY

- The research for this report consisted of:

  - Client interviews.

    . INPUT clients were sampled to determine their areas of special interest and to learn of their experiences, problems, and needs in this area.

- Corporate interviews.

  . Structured interviews were conducted with 25 Information Systems (IS) personnel in several industries in September and October 1985. The questionnaire used is in Appendix C.

- Vendor interviews.

  . Interviews were conducted with 21 vendor representatives from VANs, RCSs, and software providers. The questionnaire guides are in Appendices D and E.

- Industry observer interviews.

  . Interviews were conducted with eight representatives of industry associations and academic observers of EDI developments.

- Product and service analysis.

  . INPUT collected and analyzed information on 18 EDI services and software, and reviewed secondary research sources.

- Other studies.

  . Research conducted for other INPUT published studies has been used when appropriate to further understanding of the issues and markets discussed.

C. SCOPE

- The study addresses the following topics:

  - Electronic Data Interchange: Its development in the transportation industry and its expanding role in other industries (Chapter III).

  - Issues related to EDI: Standards, security, new communications protocols, and international, legal, economic, and human factor considerations, as well as related developments in electronic mail techniques (Chapter IV).

  - How EDI is being used in several industries: Marketing and strategy analysis, profiles of EDI services, development and marketing approaches, market observations, and industry forecasts (Chapter V).

  - Recommendations and identified opportunities for vendors: VANs, RCSs, software developers, hardware manufacturers, turnkey systems providers, and professional information services (Chapter VI).

- Definitions of terms used in this report are contained in Appendix A.

D. RELATED INPUT REPORTS

- U.S. Information Services Markets, Volume I: Industry Specific Markets, Volume II: Cross Industry Markets, 1984.

  - These reports analyze patterns and levels of spending in U.S. information services. Volume I addresses 14 industry-specific markets, including banking and finance, manufacturing, insurance, medical, and

others, with five-year forecasts detailing expected spending levels and growth rates. Volume II analyzes services in applications such as accounting and payroll, systems software, and utility processing, and vehicles such as value added networks and on-line data bases.

- Personal Computer Opportunities for Remote Computing Services Vendors - U.S., 1983.

  - The explosive growth of microcomputers in business presents both a threat and an opportunity to the RCS vendor. The report identifies users' needs and attitudes. Responses of the RCS vendors to the challenge are analyzed, and the impact of trends revealed are synthesized into a self-analysis methodology to help RCS vendors understand their opportunities. The report concludes with specific strategy recommendations.

- Successful RCS Strategies for the 1980s, 1984.

  - This report examines the "how" and "why" of successful RCS products. The reports provide examples, recommends strategies for changing delivery modes when necessary, and projects the future for successful RCS companies.

- Systems Versus Services for Small Organizations: New Decision Criteria, 1984.

  - This report analyzes the next area of RCS on which micros will have an enormous impact: the largely batch, cross industry services performed for small organizations. The report examines what users want, what type of service or system they will use, and how they will choose.

- Market Opportunities in Network Services, 1982.

  - This report provides analyses and recommendations for tactical and strategic applications in value added network services. Covered are vendors, user characteristics, user satisfaction, applications, plans, and intentions. A five-year forecast is presented along with user perceptions of the impact of various developments such as local area networks, microcomputers, and bypass technologies.

- Annual Information Systems Planning Report, 1985.

  - The research for this report, based on extensive interviews with information systems organizations and vendors, describes major events and projects trends in the hardware, software, and communications industries. The findings are summarized by industry and for all organizations.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

- This Executive Summary is designed in presentation format to help the reader quickly review key research findings and recommendations. It will also provide an executive presentation complete with script to facilitate group communications.

- The key points of the entire report are summarized in Exhibits II-1 through II-8. On the left-hand page facing each exhibit is a script explaining that exhibit's contents.

A. WHAT IS EDI?

- Electronic Data Interchange is the electronic transfer of business information between organizations in a structured application.
  - It is process-to-process communication.
  - The organizations may have different computers, terminals, protocols, and data formats.
  - Typical applications are the transfer of electronic purchase orders, invoices, bills of lading, and other documents which would normally be sent by mail.
- For market analysis purposes, this study focuses on third-party EDI services.
- The report excludes consumer-oriented applications such as electronic shopping, Automatic Teller Machine (ATM) networks, Point of Sales (POS) terminals, airline reservation systems, and private EDI implementations which are captive networks used for transactions between two parties.
- It also excludes person-to-person electronic mail which consists of messages with unknown content and form; EDI's structure is known in advance.

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ELECTRONIC DATA INTERCHANGE

The Computer-to-Computer Exchange of Intercompany Business Documents and Information

B. WHY USE EDI?

- Businesses have been electronically transferring standard business documents between trading partners for approximately 15 years. Large companies have been able to require smaller, dependent suppliers to accept their defined formats.

- Now, smaller companies are recognizing the benefits of EDI, and new standard formats are facilitating communications between dissimiliar systems.

- EDI leads to substantial cost savings in preparing and transmitting routine business documents. Manual paper document preparation can cost approximately $50. With EDI, the cost ranges between $3-12, with the electonic portion costing under $1.

- Other EDI benefits are:

  - Fewer errors due to misunderstandings or rekeyed data.

  - Faster responses to electronic purchase orders due to instantaneous electronic communications.

  - Better customer service due to the integration of EDI documents with order processing and other applications.

  - Enhanced control with integration of EDI and other applications such as management report generators and forecast and statistical analysis packages.

INPUT®

WHY USE EDI?

Reduced Expenses
Fewer Errors
Improved Turnaround
Better Customer Service
Enhanced Management Control

C. WHO PARTICIPATES IN THE EDI MARKET?

- Large companies use EDI to communicate with their smaller trading partners, but as trading relationships grow more complex, networks grow in complexity.

- Third parties now provide EDI network management services, protocol/speed conversion, error correction, data validation, format translation, and store and forward services.

- The participants include Value Added Networks (VANs) and their processing affiliates: McDonnell Douglas, General Electric Information Services (GEISCO), Control Data, IBM's Information Network, and AT&T.

- Other paricipants are Remote Computing Services (RCS) such as Informatics General, TranSettlements, Railinc, and SCM Kleinschmidt.

- EDI software is provided by small vendors including EDI, Inc., Metro-Mark Integrated Systems, Program Sciences Incorporated, and The APL Group.

- Industry associations are helping to establish standards, design systems, and endorse vendors. These associations include the Transportation Data Coordinating Committee, the Universal Product Code Council, the Automotive Industry Action Group, and the Graphic Communications Association.

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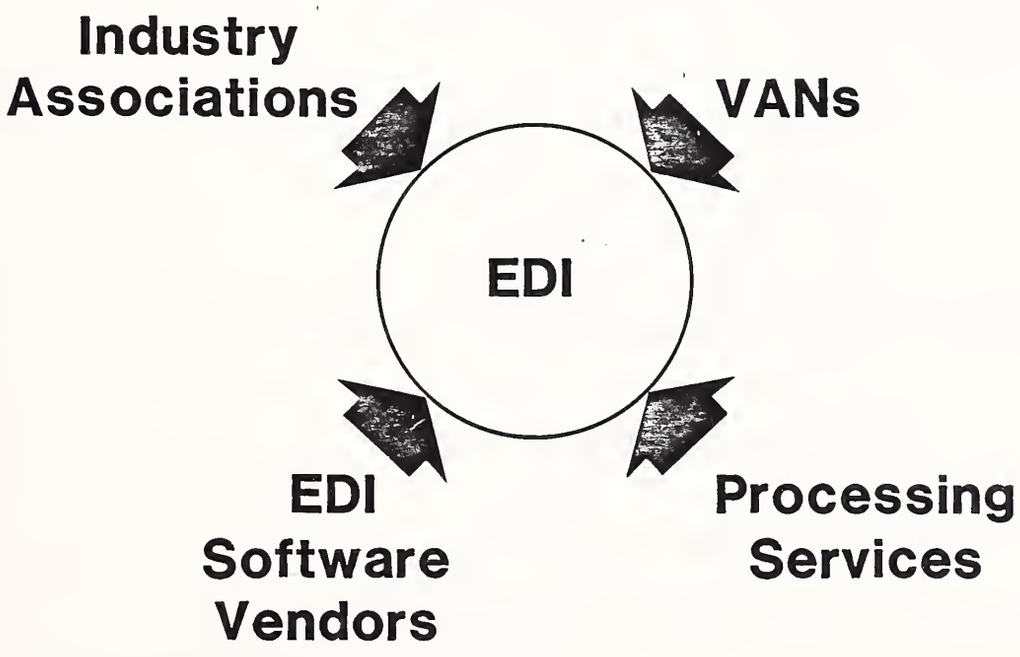
WHO PARTICIPATES IN THE EDI MARKET?



D. EXPONENTIAL EDI GROWTH: A $1.5 BILLION MARKET BY 1990

- While EDI has been available for several years, it has not grown as its benefits would indicate. The reasons include a lack of awareness, low levels of computerization, low standards acceptance, economic responsibility questions, and human factors.

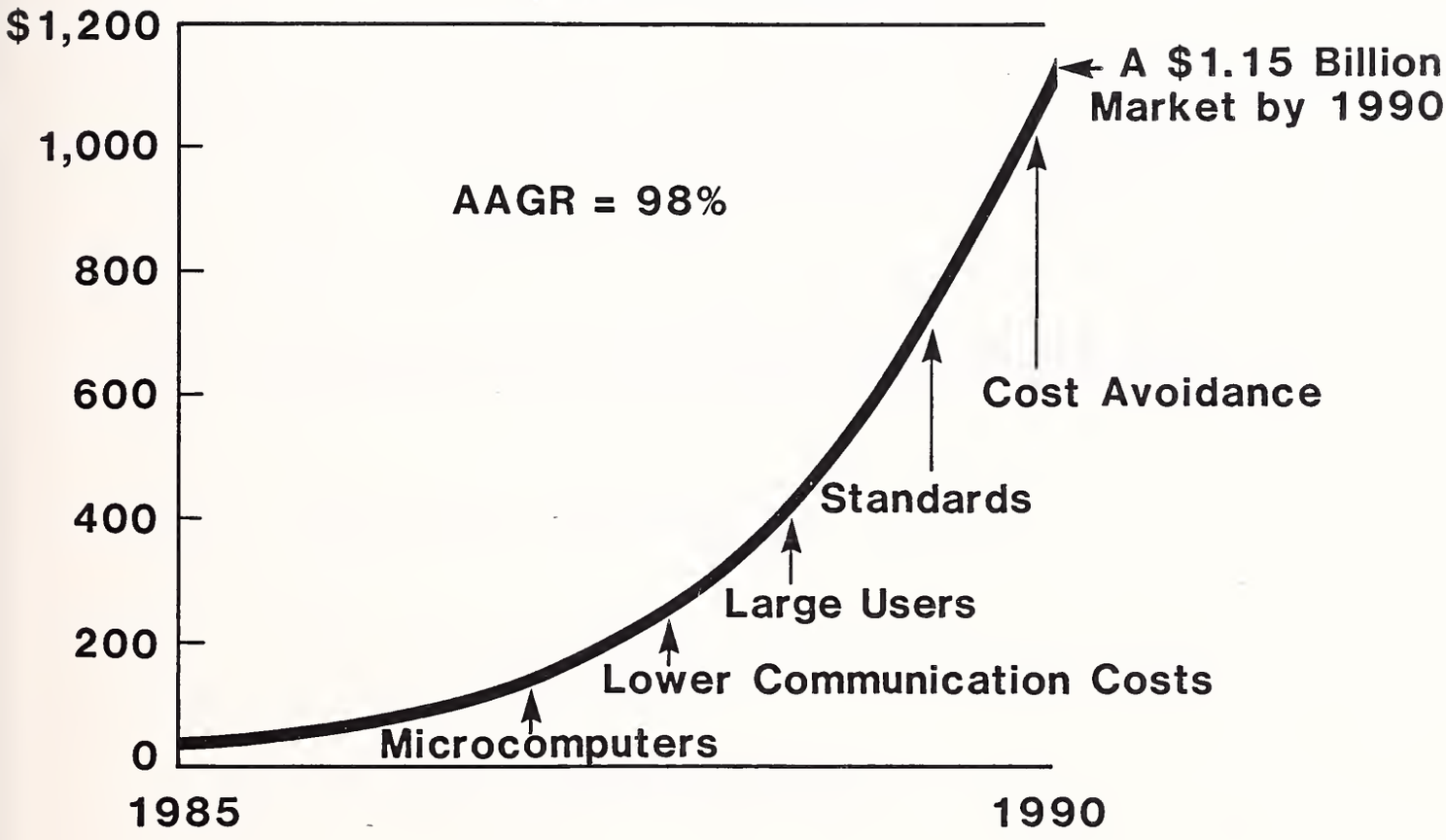
- Due to the convergence of several technologies and business realities, EDI will grow substantially. These factors include:

  - The acceptance of microcomputers.
  - Lowering communications costs.
  - Large companies requiring smaller suppliers to use EDI.
  - The acceptance of standards.
  - Needs to cut costs.

- INPUT projects the market for EDI services will grow from an estimated $38 million in 1985 to approximately $1.15 billion by 1990, an average annual growth rate of nearly 100%, but growth could reach $1.4 billion.

- Transaction volume will grow from an estimated $80 million annually to approximately $2.8 billion by 1990, an average annual growth rate over 100%. However, the potential is much higher; INPUT estimates that 25 billion business documents are transmitted through the mails each year.

EXPONENTIAL EDI GROWTH
($ Millions)



E. CENTRAL RECOMMENDATION: BUILD EDI AWARENESS

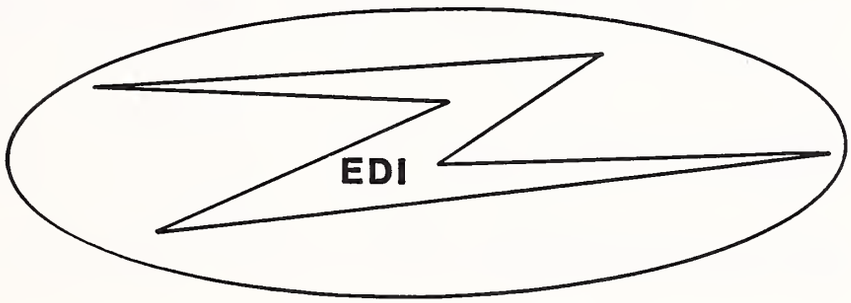
- INPUT's key recommendation centers on creating and building recognition of EDI's benefits.

- INPUT found Information Systems (IS) managers had limited knowledge of EDI, and there have been relatively few published articles.

- Accordingly, market participant and industry groups should promulgate EDI awareness, not only to IS, but also to corporate end-user departments such as purchasing, procurement, and other business operations.

- INPUT also recommends the establishment of an EDI symbol as a marketing tool, the placement of trade articles, sponsored seminars, and user groups.

CENTRAL RECOMMENDATION: BUILD EDI AWARENESS



- Market to End-User Departments
- Sponsor Seminars
- Place Articles
- Adopt an EDI Symbol

F. EDI RECOMMENDATIONS: VANs

- Some Value Added Networks (VANs) and their processing affiliates are now providing EDI services. Present and future participants should:
  - Use EDI to prevent current customers from signing with other services.
  - Position electronic mail with forms capability as "poor man's EDI," using system accounting to identify prospects for full EDI services.
  - Consider unconventional pricing schemes such as flat rates, and consider bonus plans and premiums to encourage usage.
  - Consider internetworking agreements to allow users of one service to exchange information with users of another, as a step toward universal data communications.
  - Provide full EDI service, including networking, processing, and implementation consulting.
  - Provide gateways to industry-specific data bases and use system transactions to develop unique on-line data bases for market analysis and forecasting.

EDI RECOMMENDATIONS: VANS

- Use EDI to Keep Customers
- Use E-Mail Forms as "Poor Man's EDI"
- Consider Unconventional Pricing
- Consider Internetworking and Data Base Gateways
- Provide Full Service

G. EDI RECOMMENDATIONS: REMOTE COMPUTING SERVICES

- While VANs have affiliated processing services, EDI is also being provided by smaller RCSs which do not operate their own value added networks.

- In order to successfully compete in the EDI market, these remote computing servicers should:

  - Evaluate their current users' needs for EDI. A strong customer knowledge can be invaluable.

  - License rather than develop EDI software, and integrate EDI with other on-line applications.

  - Provide professional services to integrate EDI with user applications and provide training and implementation support.

  - Strengthen their marketing through joint ventures.

  - Cultivate consultants.

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EDI RECOMMENDATIONS: REMOTE COMPUTING SERVICES

- Evaluate Current User Needs
- License Software and Integrate Applications
- Provide Professional Services
- Strengthen Marketing

H. EDI RECOMMENDATIONS: SOFTWARE VENDORS

- The EDI software marketplace is characterized by small vendors with a relatively few number of installations. Some of the VANs also market their own or acquired software.

- In order to successfully compete in the fast developing EDI marketplace, independent EDI software vendors should:

  - Develop micro-based EDI software to capitalize on first stage EDI implementations using microcomputers, especially in small organizations.

  - Form strategic alliances with larger companies which have stronger marketing organizations.

  - Integrate EDI with other applications such as order entry, inventory control, materials resource planning, distribution, and decision support systems.

- There are also opportunities for professional services companies to help EDI implementors resolve incompatibilities, integrate EDI to existing applications, and convert batch oriented systems to on-line systems.

EDI RECOMMENDATIONS: SOFTWARE VENDORS

- Develop Micro Software
- Form Alliances with Larger Companies
- Integrate EDI with Other Applications

III ELECTRONIC DATA INTERCHANGE: OVERVIEW

III ELECTRONIC DATA INTERCHANGE: OVERVIEW

A. BACKGROUND

1. BEFORE EDI

- Many companies have installed computerized systems to support business operations. Such systems require data input and system management personnel.

- Typically, a business will use a computer system to prepare a variety of documents such as purchase orders, invoices, shipping instructions, and payment authorizations which are then printed and mailed to suppliers, customers, and banks. Alternately, the telephone may be used to relay information such as order status reports and shipment tracing inquiries.

- Some large companies have used electronic means of transferring data to dependent suppliers for many years. Sometimes this is done by physically transporting a computer tape, but more recently, private or public communications networks are used.

  - These transfers require trading partners to accept whatever format the large company provides, essentially forcing a standard on the supplier with the penalty being the loss of substantial business.

- A supplier with many customers may be required to adapt to as many formats.

- This form of EDI has been used by a relatively few companies.

- Generally paper documents are the dominant mode of business exchanges, particularly by smaller companies.

- Computer prepared information forms a data base which can be used in a variety of corporate management reports, including budgets, accounting, forecasting, and government reports.

- The traditonal ways of preparing and managing business documents have inherent problems.

  - Paper or verbal information is not directly usable by computers.

  - Telephone ordering is labor intensive and error prone.

  - Errors can be introduced at any stage of manual data entry or verbal communication.

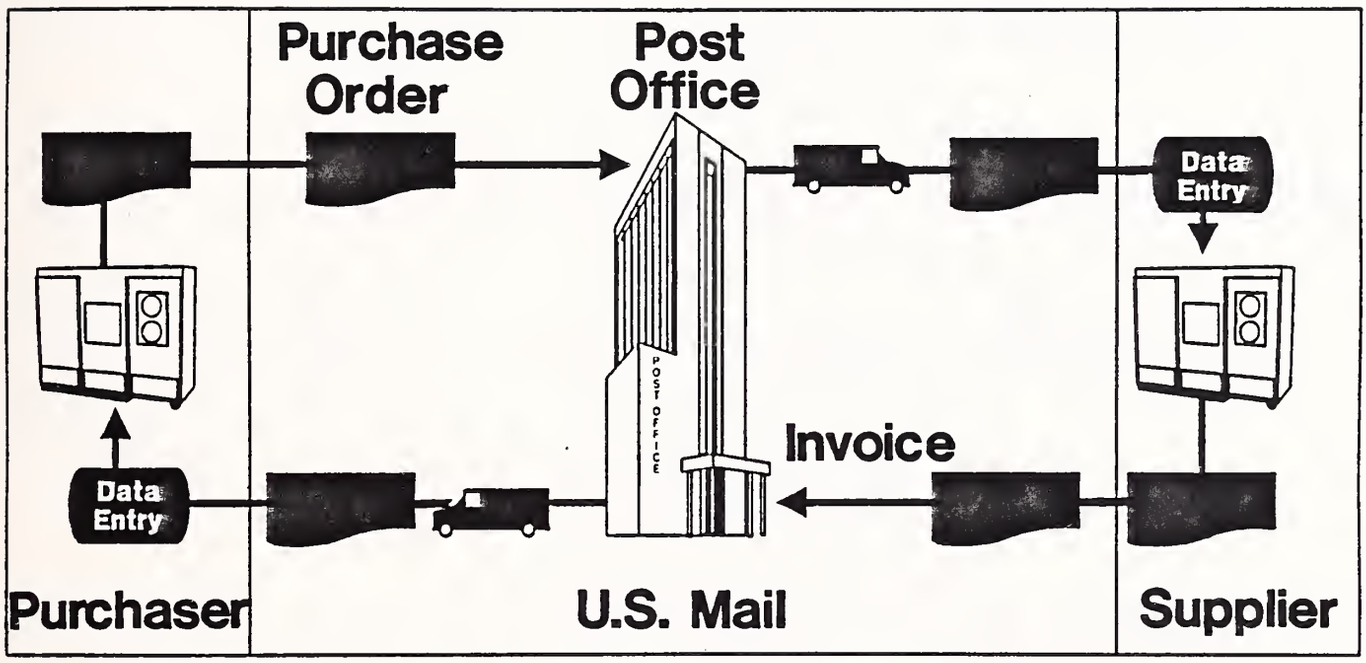
  - Reliance on the mails slows turnaround time.

- Further, companies have often invested in excess safety stock. While improving customer service, this affects the ability to turn over assets quickly, an important factor in achieving adequate returns on investment.

- The situation before EDI is shown in Exhibit III-1.

EXHIBIT III-1

WITHOUT EDI



2. AN ALTERNATIVE IS NEEDED

- Due to these problems and inefficiences, alternatives to "business as usual" are being sought.

- Other factors calling for alternatives include: needs for competitive tools, needs for current business information, economical new technologies, modern business operational dynamics, and increasing costs in production, storage, transportation, and administration.

- Ideally, a company's computer system should directly link to another company's system. However, there are some basic problems with this simplistic solution.

  - The computers may not be compatible.

  - Information may be formatted in different ways. Company A's purchase orders may be structured differently than company B's.

  - Direct computer-to-computer communications links can be inefficient and costly.

- Compounding these problems are complex business relationships.

  - Companies do business with multiple business associates, often across industry segments.

  - Involved are manufacturers, distributors, wholesalers, warehouses, retailiers, and transporters.

- These problems are shown in Exhibits III-2 and III-3.

EXHIBIT III-2

INCOMPATIBLE EQUIPMENT AND PROTOCOLS

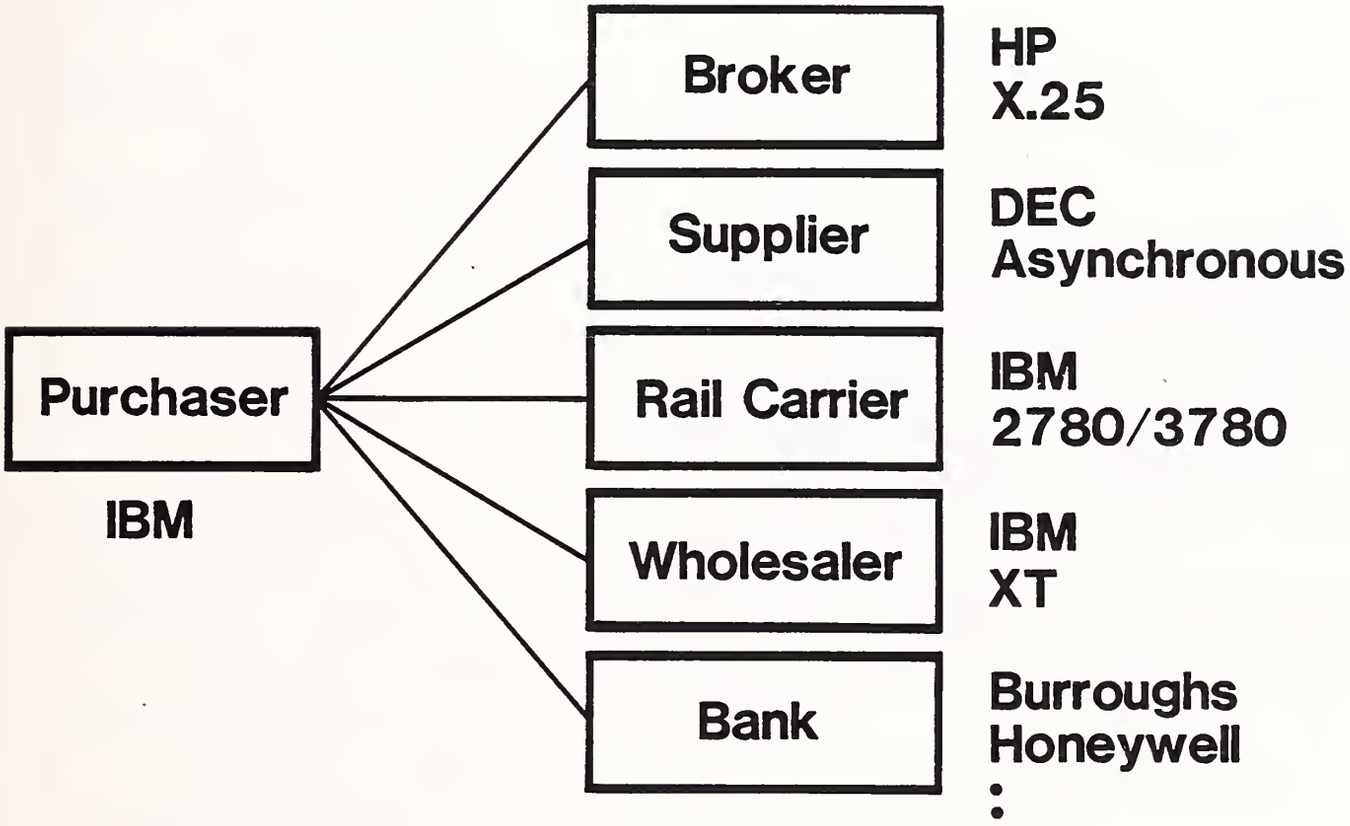
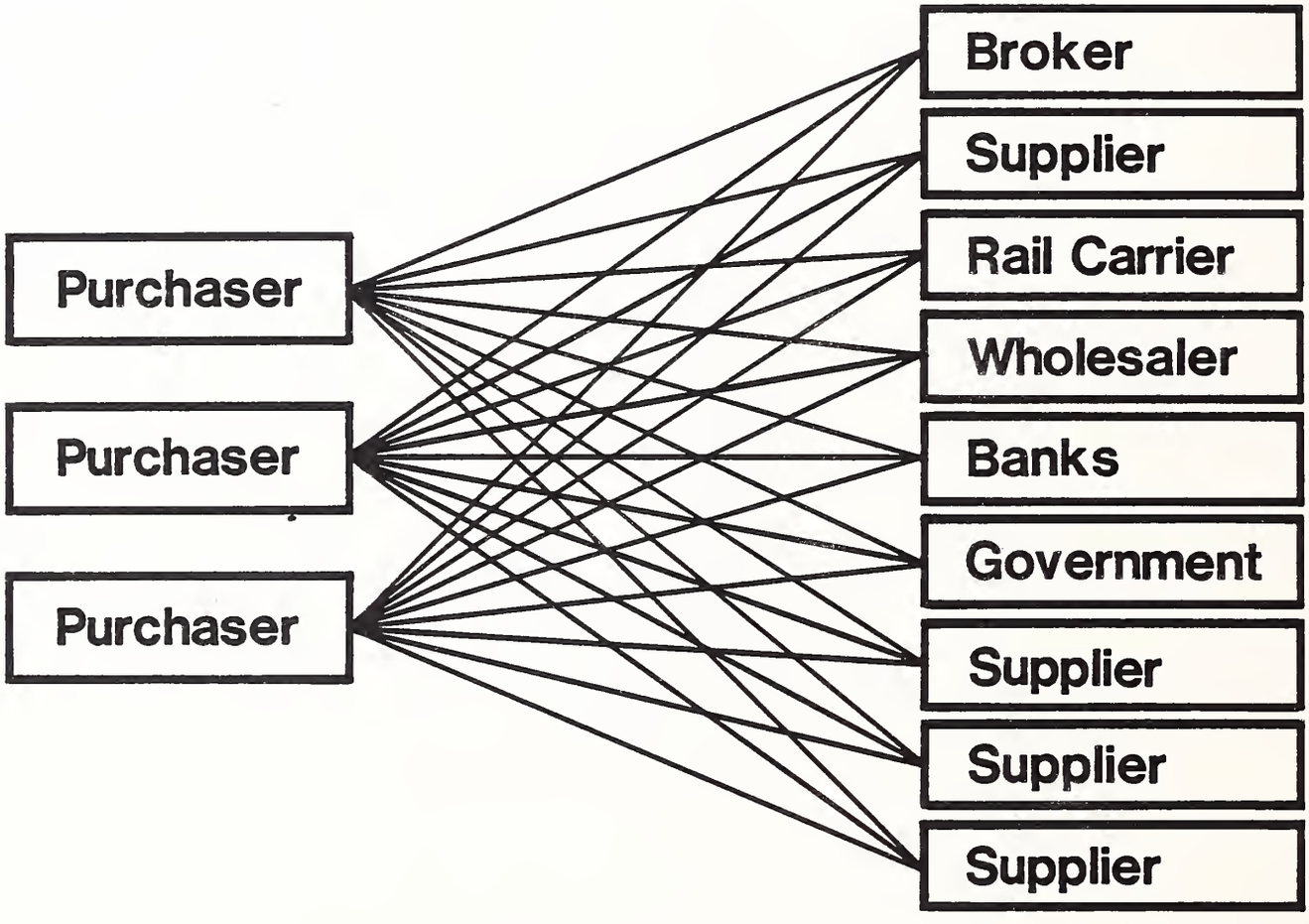


EXHIBIT III-3

NUMEROUS PARTICIPANTS



3. WITH EDI

- EDI works to overcome these problems by providing standards for direct or indirect linkages between corporate computers.

- Several alternatives are available:

  - A company and its trading partners may implement a point-to-point or private network EDI system with agreement on standards for document formats and communication protocols. EDI software installed by each participant handles any remaining incompatibilities.

  - A third party such as a Value Added Network (VAN) or a Remote Computing Servicer (RCS) may provide translation services for different information formats and communications protocols.

- Point-to-point EDI systems are often inconvenient to both parties.

  - Sending and receiving information throughout the day may conflict with other data processing needs.

  - Transmission schedules need to be established and may be difficult to manage.

  - Communications links are expensive to install and maintain.

- Proprietary EDI systems based on private networks can serve industries with a few trading partners, but they tend to constrict communications to those on the network who have a traditional business relationship.

- RCS or VAN options are most suitable for industries with many trading partners and a high volume of transactions which may cross industry lines.

4. EDI HISTORY

- Electronic Data Interchange grew out of on-line order entry systems and electronic messaging. It was driven largely by transportation industry interests.

  - The Transportation Data Coordinating Committee (TDCC), a non-profit industry organization, was an early activist. TDCC President Edward A. Guibert is recognized as EDI's founding father, due to his efforts beginning in 1969.

  - The TDCC remains important in establishing and maintaining EDI standards, issuing software, coordinating transportation users, and working with value added networks (VANs) for transmission and conversion services.

- Other industries now involved in EDI include warehousing, distribution, groceries, energy and natural resources, electronics, automakers, drugs, chemicals, and retail sectors. Industry associations have formed committees to coordinate EDI activities and endorse services.

5. EDI SERVICE DISTINCTIONS

- EDI market services need to be distinguished to aid understanding of the market.

  - Network Services include maintenance of access points, error correction, protocol and speed conversions, switching between two computers for "direct" real-time communications, and internetworking through gateways. These services are provided by value added networks.

  - Processing Services include data field validation, data format translations, standard conversions, and separating electronic transactions

submitted in a batch mode based on destination for routing to electronic mailboxes in store and forward applications. These services are provided by the processing affiliates of VANs and by RCSs.

- EDI related processing services include reports generated from consolidated transactions; however, the costs of these services are not included in the EDI market forecast as they are provided at customer request by the service provider and do not directly involve other trading partners.

B. VAN SERVICES

- Value Added Networks have two roles in EDI:

  - VANs provide the communications links, either through their general network or by configuring virtual private networks--a section of the general network dedicated to full time service for a specific customer.

  - VANs, through their affiliated companies, also provide processing and conversion services, permitting companies with incompatible computers and document formats to communicate.

    . Electronic mailbox services separate documents from a message stream and consolidate them for individual addresses.

    . Outcall services automatically connect EDI user processors to their mailboxes for downloading/transferring transaction data.

- The major VANs providing EDI services are McDonnell Douglas Electronic Data Interchange Systems (formerly a part of Tymnet), General Electric Information Services Company, Control Data Corporation's Business Information Services (working with AT&T), and AT&T itself.

- VAN services are further discussed in Chapter V, Section B, and VAN/EDI services are briefly profiled in Appendix B.

C. REMOTE COMPUTING SERVICE SOLUTIONS

- RCSs have a role similar to VAN-affiliated processing services except they usually do not operate their own network. Instead, customers use a VAN, direct dial-in, an 800 number, or supply computer tapes for conversions. Some RCS participants in EDI are Informatics General, SCM Kleinschmidt, and TranSettlements.

- RCS/EDI services are discussed in Chapter V, Section C and in Appendix B.

- Exhibit III-4 shows VAN and RCS roles in EDI services.

D. SOFTWARE SOLUTIONS

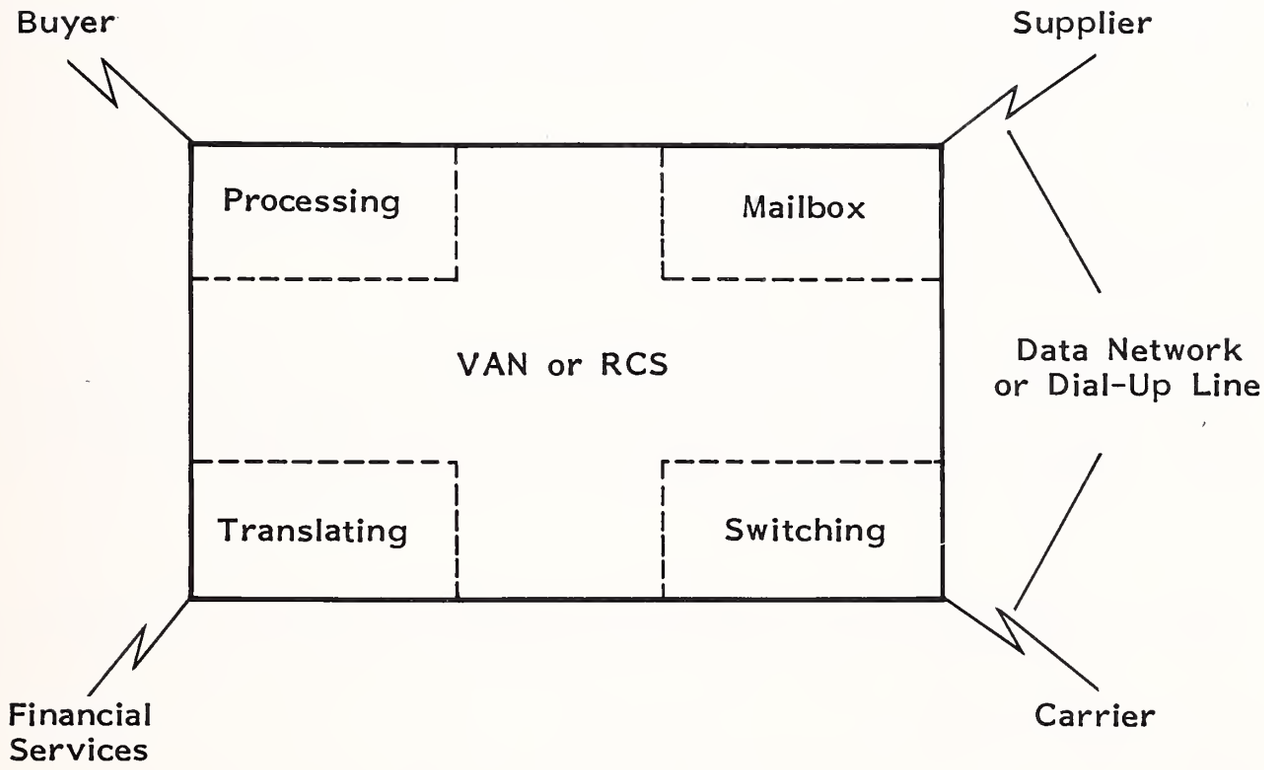
- Users subscribing to VAN or RCS services may rely on software hosted on the vendor's processors to perform format conversions, or may internally convert private formats to industry standard formats prior to transmission.

- If developing a private, proprietary EDI network, users can purchase EDI software or write their own.

    - If purchased, customization by the software vendor, consultants, or the user's development staff is usually required.

EXHIBIT III-4

VAN/RCS ROLE IN EDI



- EDI software should be closely linked to existing applications for management reporting and other functions.

- EDI software is available from the TDCC, EDI Inc., the APL Group, McDonnell Douglas, Program Sciences Incorporated, TranSettlements, Inc., Data Architects, and Metro Mark Integrated Systems.

- EDI software company products and strategies are also evaluated in Chapter V, Section D of this report and in Appendix B.

E. TECHNOLOGY AND MARKET OBSERVATIONS

- EDI uses communications services to provide computer-to-computer linkages. These links may be private networks, dial-up lines, 800 service, or VANs.

- Full discussion of technological developments is beyond the scope of this report, but a few observations will provide perspectives relative to the EDI marketplace.

1. VANs ARE COMMODITIES AND NEED DIFFERENTIATION

- VAN usage has grown rapidly over the past several years because of the growing importance of data communications and the effects of telecommunications industry deregulation.

- The VAN market is categorized by extreme competition. With the Bell Operating Companies planning intra-LATA (Local Access and Transport Area) VAN networks, competition will increase, but the opportunity for joint ventures also improves.

- VAN services are a commodity with few differences between competing vendors. Existing VANs are being attacked from the high end by hardware vendors offering packet switches for private networking to large-volume VAN customers.

  - These are being offered at significant potential cost savings for users.

  - This implies that private packet networks will become cost effective for smaller and smaller VAN users.

  - Although several existing VANs also offer private networks, most such sales result in revenue losses. They are essentially sacrificial.

- An INPUT survey of VAN users (Market Opportunities for Network Services, 1982) found low user loyalty, with 87.5% of those surveyed evaluating alternatives. Approximately half the respondents considering change were evaluating alternative VAN networks, and nearly half were considering internal networks.

- Price cutting as a response to growing competition adversely affects revenue.

- Accordingly, many VANs are differentiating by offering new "value added" conversion and store and forward services. Some VANs are targeting EDI services to specific market segments and have formed separate EDI divisions.

- Due to the number of VANs, companies wishing to communicate with each other may find they subscribe to competing networks. One VAN participant is offering a service supporting inter-VAN communications. This points to an opportunity for VANs to provide cooperative internetwork gateways.

2. PRIVATE NETWORKS ARE MORE COST-EFFECTIVE

- Deregulation and technological developments have made possible economical private data networks.

- Faster modems and new error correcting protocols make greater data communications efficiency and reliability possible.

- Aggregating services on high speed, high capacity private links (including satellite networks and T-1 carrier) offer larger users alternatives to public networks.

- Private network communications between many parties is difficult to manage; a limited community of users can be supported more easily than a complex set of relationships.

- While complex, multi-drop private networks can become unwieldy, large, industry-dominant companies often have the resources to implement and manage EDI communications on a private network. Examples include General Motors and DuPont.

3. NEW BELL OPERATING COMPANY SERVICES

- Due to recent FCC authorization, the regional Bell Operating Companies (BOCs) will likely be offering intra-LATA (Local Access and Transport Area) asynchronous to X.25 conversions and possibly IBM SNA services, with links to national packet networks, the most significant being AT&T's.

  - These new services will require end users to lease local digital lines to BOC packet network nodes (although dial-up access will also be provided) and pay port connection and usage charges.

- Corporate users will also need to buy or lease channel select units (CSUs) and multiplexers on both the user and network sides.

- If approved, the BOC/AT&T combination will become an extremely potent competitor in the VAN market, with new services sold by existing field organizations along with existing services such as private data lines.

- These proposed services will make EDI more attractive by potentially reducing dial-up or direct link costs to RCS vendors and to VAN access points which may now be beyond local calling areas. RCS communications costs for inbound and outbound WATS will be reduced if these new services are used.

- The ability use BOC packet networks for access to planned AT&T or existing VANs creates both opportunities and challenges for VANs.

  - If they participate, VANs can extend services geographically to smaller potential EDI users without investing in facilities.

  - However, this approach does require cooperation with a competitor for the "last mile" connection and competing in the free market with AT&T for long-haul connections.

- A key advantage for users of public VANs, virtual private networks, or intra-LATA services for EDI is that users and service providers do not have to be concerned with maintenance or other factors which may add costs because network management is the responsibility of the network vendor.

4. ELECTRONIC MAIL (E-MAIL) IS DEVELOPING EDI FEATURES

- Electronic mail can be used for low volume EDI-like applications. Several of the E-mail services offer form creation options permitting "fill-in-the-blanks" usage for order entry, inquiries, and other documents.

- E-mail form systems can serve as low volume EDI-type networks. They provide users with a starting point for future systems as volume grows. This creates a migration path opportunity for E-mail providers.

- A typical on-line data entry service is MCIMail's SCRIPTS.

  - Electronic forms such as purchase orders, on-line order entry, sales reports, employee activity reports, insurance registration information, loan applications, and survey questionnaires are possible applications.

  - SCRIPTS checks for data entry errors and issues "help" messages when it detects a mistake. When the question to be asked depends on the user's answer to a previous question, SCRIPTS uses branching logic to prompt with the appropriate question.

  - The output format can be an electronic message downloaded as a data file for further processing or as an electronic message.

  - Forms are prepared using a microcomputer and some of the commands from dBASE II. Users can specify input prompts, validation criteria, output formats, and address and handling instructions for electronic mail forms.

  - When a form is called up, MCIMail will first verify authorization to use the form, and will then:

    . Interactively prompt the user for information.

    . Validate each data input as specified by the script.

    . Issue error and help messages as necessary.

. Prepare the information in a specified format.

. Transmit the complete form via MCIMail to specified recipients.

- Users can tailor electronic forms to match existing forms, ensuring consistent reporting throughout a single application network.

- Future usage of E-mail between companies using competing services or dissimiliar internal software will be eased by acceptance of X.400 standards approved in 1984. Several E-mail vendors have adopted these standards.

- E-mail service companies are also offering document translation services. For example, Telentry will transform formatting codes between incompatible word processors. A buffer device is used to send documents directly to recipients.

- Other innovations in E-mail are modems with integrated buffers. An E-mail message is sent to a predesignated location (called "out-call service") where it is held in the buffer until accessed.

- A related development is the Document Interchange and Document Communications Architectures (DIA/DCA) from IBM which translates between different formats used by IBM office systems.

5. NEW COMMUNICATIONS PROTOCOLS ARE EMERGING

- Two relatively new dial-up, error correcting communications protocols are emerging, backed by competing entities, which have implications for EDI.

a. MNP

- The Microcom Networking Protocol (MNP) error correcting protocol will probably be submitted for certification to the American National Standards Institute and the CCITT.

- Modem manufacturer Microcom took the unique strategy of separating the protocol from its communications software, thus making it machine independent, and offering the protocol to vendors for use in both hardware and software.

- A number of network vendors, including IBM, GTE Telenet, MCI, British Telecom, Uninet, AT&T, and the European standards committee CEPT (Conference of European Posts and Telephones) are embracing the protocol, which is modeled after International Standards Organization (ISO) specifications.

b. X.PC

- Competing with MNP is X.PC developed by Tymnet, Inc.

  - X.PC is in the public domain while MNP charges implementers a $2,500 licensing fee covering documentation and training.

  - It is a subset of X.25 packet networking protocol, and with modifications will support X.32 high speed, dial-up, synchronous implementation of X.25 communications when supporting equipment becomes available.

  - However, X.PC does not have a file transport protocol, although to be more competitive with MNP, Tymnet is considering developing this feature or adopting an existing standard such as X.400 electronic mail standards. Currently, file transfers are accomodated on an application-by-application basis.

  - MNP also enjoys a larger installed base and will revert to normal asynchronous communications if one modem on the link does not support MNP. This is not possible with X.PC.

- It is expected that MNP will become at least a de facto standard. Use of products incorporating it will alleviate the problem of having to accommodate multiple communications protocols for remote EDI communications.

- However, VANs are not uniformly adopting MNP. Those that have say they will also offer X.PC if users demand it.

- While it is too soon to confirm, both protocols may coexist, requiring VANs to supply ports for each.

- EDI involves consideration of several issues, including standards, controlling and financial responsibilities, business practices, cost issues, and security, all discussed in the next chapter.

IV ISSUES AND FACTORS IN EDI

IV ISSUES AND FACTORS IN EDI

- There are several issues and factors which affect and which are affected by Electronic Data Interchange. These factors can influence market acceptance.

A. EDI STANDARDS

- The "generic" set of standards used in EDI are the ANSI (American National Standards Institute) X.12 transaction sets which have been circulated in draft form for evaluation.

  - The transaction sets define data formats.

  - They can be used with virtually any type of computer.

  - They require transmission be sent and received between 6 a.m. and midnight, Eastern Standard Time.

  - Further, they require communications speeds of 2,400 BPS and bisynchronous protocols, but users of third-party networks can use other speeds and protocols to transfer information to the service vendor, who then converts the data to acceptable speeds, protocols, and formats.

- The first round of standard transaction sets were issued in 1983. Some have been approved while others are being reworked after public review. The current standards are designated Version 1, Release 0. The second release is expected in early 1986.

- X.12 has been adapted by several industry groups such as the automotive (AIAG), chemical (CIDX), electronics (EDX), office products (ICOPS), and transportation (TDCC) industries, each adding their unique industry nuances to the basic standard. For example, the ocean shipper industry proposed a sailing schedule format.

  - These acronyms are explained in Chapter V and in the Appendix A glossary.

- The TDCC family of standards includes grocery (UCS), warehousing (WINS), and standards known as Ocean, Air, Rail, and Motor.

- One of the problems facing those involved with establishing standards is that often multiple parties have needs which must be accommodated with decisions being made in a committee environment. This leads to lowest common denominator standards and duplicate transaction sets covering the same type of electronic documents, but with different formats.

- Coordinating various industry groups and publishing a common data directory is the Joint Electronic Data Interchange Committee, known as JEDI. JEDI hopes to avoid duplication and redundancy.

- International Standards are called GTDI.

  - GTDI stands for General Trade Document Interchange and evolved from the United Kingdom trade facilitation agency called SITPRO (for Simplification of International Trade Procedures), which lobbied for U.N. acceptance of the earlier TDI standard.

- All facilitation bodies agreed on the compromise GTDI standard for international trade.

- Additionally, so-called "private" EDI standards have been established by dominant companies in several industries which may, but more often do not, have elements in common with the other standards.

- Exhibit IV-1 shows these standards and their relationships, with the shaded intersections implying a degree of compatibility. Exhibit IV-2 provides the names and addresses of agencies involved in setting EDI standards.

- The acceptance of cross-industry standards is a key factor affecting the overall growth of EDI.

- Users averaged their concerns on standards at a mid-range rating. Those giving lower ratings have typically established their own private standards.

  - One vendor described standards as both the "salvation and the cross-to-bear."

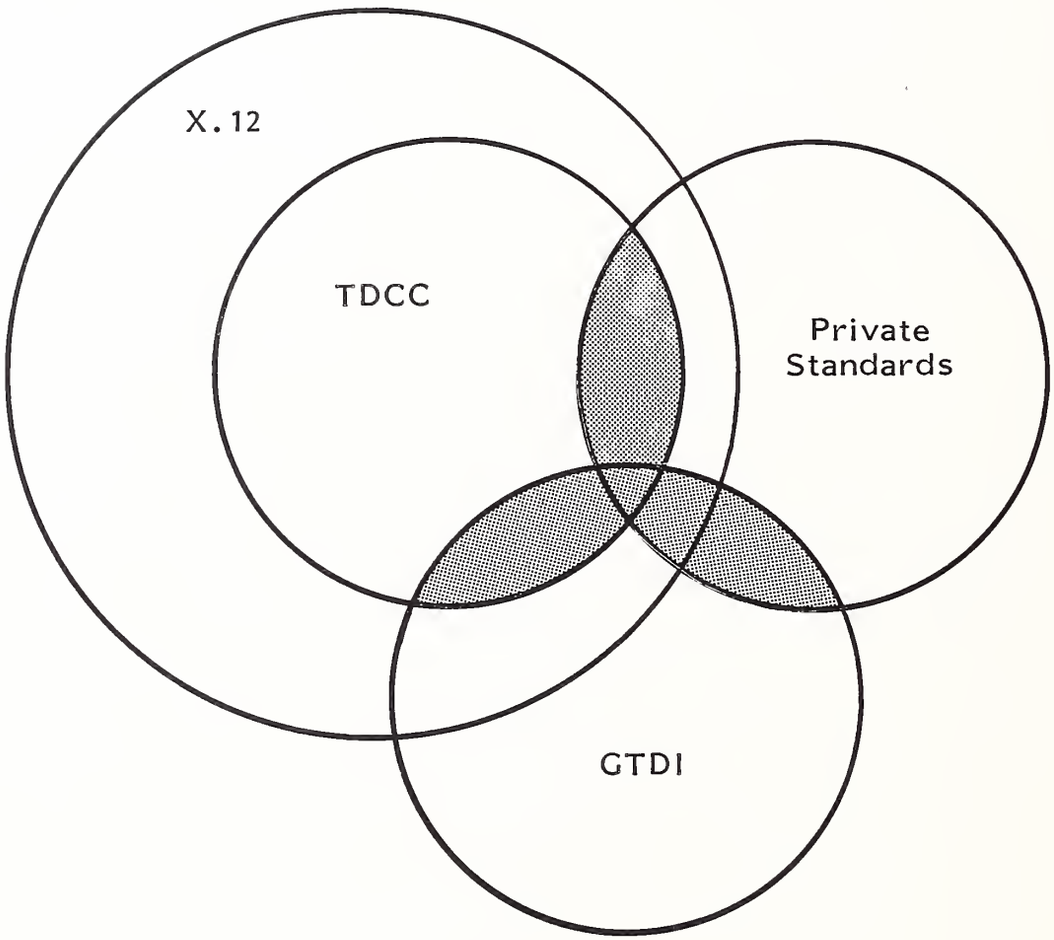
  - While X.12 standards form a generic base, industry-specific and private standards are being implemented, sometimes with compromises leading to requirements for data redundancy.

  - One company said that meeting internal needs was difficult enough without concerns for industry standards.

- The use of standards by major corporations, particularly those with cross-industry trading relationships, is having a major impact in turning previously "academic" standards into standards applied to real needs. An example is General Motor's and an auto industry associations's joint EDI efforts.

EXHIBIT IV-1

EDI STANDARD RELATIONSHIPS



Standards may or may not be completely compatible.

EXHIBIT IV-2

AGENCIES AND ASSOCIATIONS INVOLVED IN EDI STANDARDS

American National Standards Inst.
1430 Broadway
New York, NY 10018
(212)354-3300

Article Numbering Assoc. (U.K.) Ltd.
6 Catherine Street
London WC2B 5JJ
Great Britian

EDI Council of Canada
1185 Eglinton Avenue East, Suite 101
Don Mills, Ontario M3C 3C6, Canada
(416)429-4444

National Association of Refrigerated Warehouses
7315 Wisconsin Avenue
Bethesda, MD 20814

National Office Products Association
3166 Des Plaines Ave., Suite 223
Des Plaines, IL 60018
(312)297-6882

Transportation Data Coordinating Committee
1101 17th Street, NW
Washington, DC 20036-4775
(202)293-5514

Steel Service Center Institute
1600 Terminal Tower
Cleveland, OH 44113
(216)694-3630

American Paper Institute
260 Madison Avenue
New York, NY 10016
(212)340-0600

Automotive Industry Action Group
North Park Plaza, Suite 830
17117 West Nine Mile Road
Southfield, MI 48075
(313)569-6262

Graphics Communications and Computers Association
1730 North Lynn Street, Suite 604
Arlington, VA 22209
(703)841-8160

National Commission on International Trade Documentation
30 E. 42nd Street, Suite 1406
New York, NY 10017
(212)687-6261

Paper Trade Association
420 Lexington Avenue
New York, NY 10017
(212)682-2570

Technical Association of the Pulp and Paper Industry
One Durwoody Park
Atlanta, GA 30338
(404)446-1400

Uniform Code Council
7051 Corporate Way, Suite 201
Dayton, OH 45459
(513)435-3870

- Private standards have the effect of binding customers to the company, but also constrict data interchanges to those accepting them.

B. SECURITY

- Users interviewed by INPUT almost uniformly placed the highest value on security as a concern.

- Information about a company, its customers, and its sales is confidential. Other companies receive this information only to perform needed services. Each company and third-party vendor is responsible for keeping its data from unauthorized parties. The data elements which may be transmitted to authorized parties are specified in EDI standards.

- Users are concerned about internal breaches of security as well as the vulnerability of information sent to and through third parties. There are also concerns that data be properly translated between formats and validated.

- Because it is of such concern, EDI developers and services directly address the issue.

  - EDI systems are designed to provide as high a level of security as mail or telephone service; in fact, EDI is moe secure from unauthorized access to sensitive data due to multi-level password capabilities and other safeguards.

  - System design prevents the comingling of information. Users control trading relationships and define valid transaction types and formats. Exceptions are flagged and resubmitted for correction or system administrator review.

- Information requests from unauthorized parties are not acknowledged, but the data is made available to the operations manager for follow-up action.

- Storage techniques distribute file information, making it difficult to assemble information without authorization.

- Prior to responding to inquiries, senders validate communications and control headers and confirm requestors codes with those in the master records for the transaction.

- For electronic fund transfers, EDI standards require that communications be made only to user's banks.

  . Communications between banks uses banking industry standards.

  . A user's bank sends completed payment notifications based on actions initiated by a trading partner with their own banks.

- EDI through a third party offers a layer of security since trading partners do not directly access each other's computers.

- Many third-party vendors commission security audits covering physical as well as data security. These audits are available for customer review.

C. AWARENESS

- Users interviewed by INPUT had a generally low personal awareness of EDI.

- INPUT's literature survey found relatively few EDI references (under 20). These findings suggest more marketing and promotional efforts are needed.

D. DISPARATE COMMUNICATIONS NETWORKS

- The non-universality of communications links is another factor. A customer of one VAN or RCS wishing to exchange data with a firm using another VAN or RCS is required to enter agreements with those entities.
  - The situation is similar to the early history of the telephone, when subscribers had instruments from several telephone companies in order to communicate with subscribers of other firms.
  - Today, this situation is found with EDI, electronic mail, and other data exchanges.
  - Although direct, dial-up connections are possible, they can be costly.
- Users rated their concern for reliance on one vendor fairly high.
- Inter-VAN clearinghouses or agreements between VANs for cross-network exchanges will improve the situation, but add gateway access charges. Nevertheless, they are seen as necessary to insure broadscale EDI acceptance. (See Chapter V, Section B for a further discussion of clearinghouses.)
- Acceptance of the Integrated Services Digital Network (ISDN) will eventually lead to universal data communications.

E. CUSTOMIZATION

- Companies installing translation software usually require customization to convert currently used data formats to EDI formats. Also, the links to other applications need to be written.

- Users interviewed by INPUT said that by a factor of three to one they would write EDI software themselves rather than buy it.

  - The reasons given were related to staff expertise and also to the perception there was little or no EDI software available; again, an awareness problem.

  - Approximately 25% of those planning to write software said they would modify an outside package according to their needs.

- A company may not have the resources to handle an EDI project due to an applications backlog. Many companies interviewed would employ consultants or professional services firms to handle customization and assist in implementation.

- Users interviewed gave an average mid-range rating to the chance they would use outside help for EDI implementation.

F. TERMINALS AND TURNKEY SYSTEMS

- The IBM PC de facto "standard" workstation provides favorable economies in interfacing terminals, particularly by small users.

- The lowering costs of microcomputers will be a key factor in the future growth of EDI. Smaller companies can now afford to become computerized.

- In some early EDI situations, suppliers required dedicated terminals, and customers with several suppliers had multiple terminals. This tends to require users to stand in line to use a specific terminal. Instead, many would revert to inefficient telephone methods.

- In place of multiple terminals, terminals or micros capable of accessing multiple suppliers and used by those responsible for intercompany communications are recommended.

- Users were asked to rate the likelihood of purchasing a turnkey EDI solution.

  - The average rating was below midrange.

  - The reasons given for low ratings are directly related to having hardware on hand which can be used for EDI.

G. INTERNAL CHANGES

- Users rated their concerns over the changes required in converting paper forms to electronic methods above midrange.

- Usually the change from manual to electronic systems will involve parallel systems as the changeover is implemented. Users usually test one or a few documents at a time to allow for gradual new system adoption with minimal disruption or "surprises."

H. LEGALITY

- The acceptance of EDI transmitted documents as binding contracts is left to the marketplace and negotiation between individual buyers and sellers.

- Assuming the EDI system verifies receipt of data, such agreements have the same legal force as a Telex which uses an answerback code to verify transmission.

I. HUMAN AND BUSINESS FACTORS

- There are a number of human and business factors to be considered by those promoting EDI systems.

1. HUMAN RELATIONSHIPS

- The human relationships which develop over time might be a factor which would hinder acceptance of EDI. People like to have personal contact with business associates. These contacts often include personal discussions at the expense of efficiency, but enhancing business relationships.

- One provider of a proprietary EDI system reported on how people factors become important.

  - The system was initially perceived as a threat by both internal and external people. The project director worked to allay those fears through internal marketing and by designing the system with input from the external merchants who would use it.

  - The system was designed to be flexible; a rigid system would cause frustration, leading to disuse.

- The company found that the system supplements human interactions and that personalities remain important.

  - EDI does not lead to bypassing salesmen or brokers or impeding personal relationships in the sales channel.

  - Rather, because less time is spent by sales staff correcting errors, sales calls are more productive and customer service is improved.

  - The system has reduced the number of routine phone calls, and the remaining calls are more precise. Users have more background information and know how they want to resolve issues, saving time and gaining productivity.

- EDI is also seen as helping to mitigate the problems of high personnel turnovers in order processing and similar clerical functions. Less experienced operators become more efficient due to the intelligence of the EDI system and can better represent a company.

2. ATTITUDE FACTORS

- IS managers are overcoming their "protective" postures regarding to the facilities in their charge. They have a better understanding of the nature of business and are recognizing that IS is beneficial to the company and not simply an entity unto itself.

- Still, other managers are resistant to EDI.

  - Some fear a proliferation of equipment, others are computerphobic.

  - Some do not want to pay participation costs.

  - Some are waiting for standards to be finalized.

- These problems are likely to remain until less sophisticated managers retire and lagging companies are bought out or their inefficiencies and lack of competitiveness leads to failure.

- Users' ratings of EDI concerns are shown in Exhibit IV-3.

J. EDI's IMPACT ON THE PAPER INDUSTRY

- The paper industry is interested in EDI both from a user perspective and from self-interested concerns.

- Officials of the American Paper Institute have been attempting to quantify the volume which will be affected. The task requires data collection about standard forms production, apparently a non-trivial task.

  - It is estimated that 400 billion sheets of paper are used annually in U.S. businesses for all purposes.

  - Information systems have made information more economically available. Rather than leading to the "paperless" office, more hard copies are being generated, with an estimated growth rate of 5% annually.

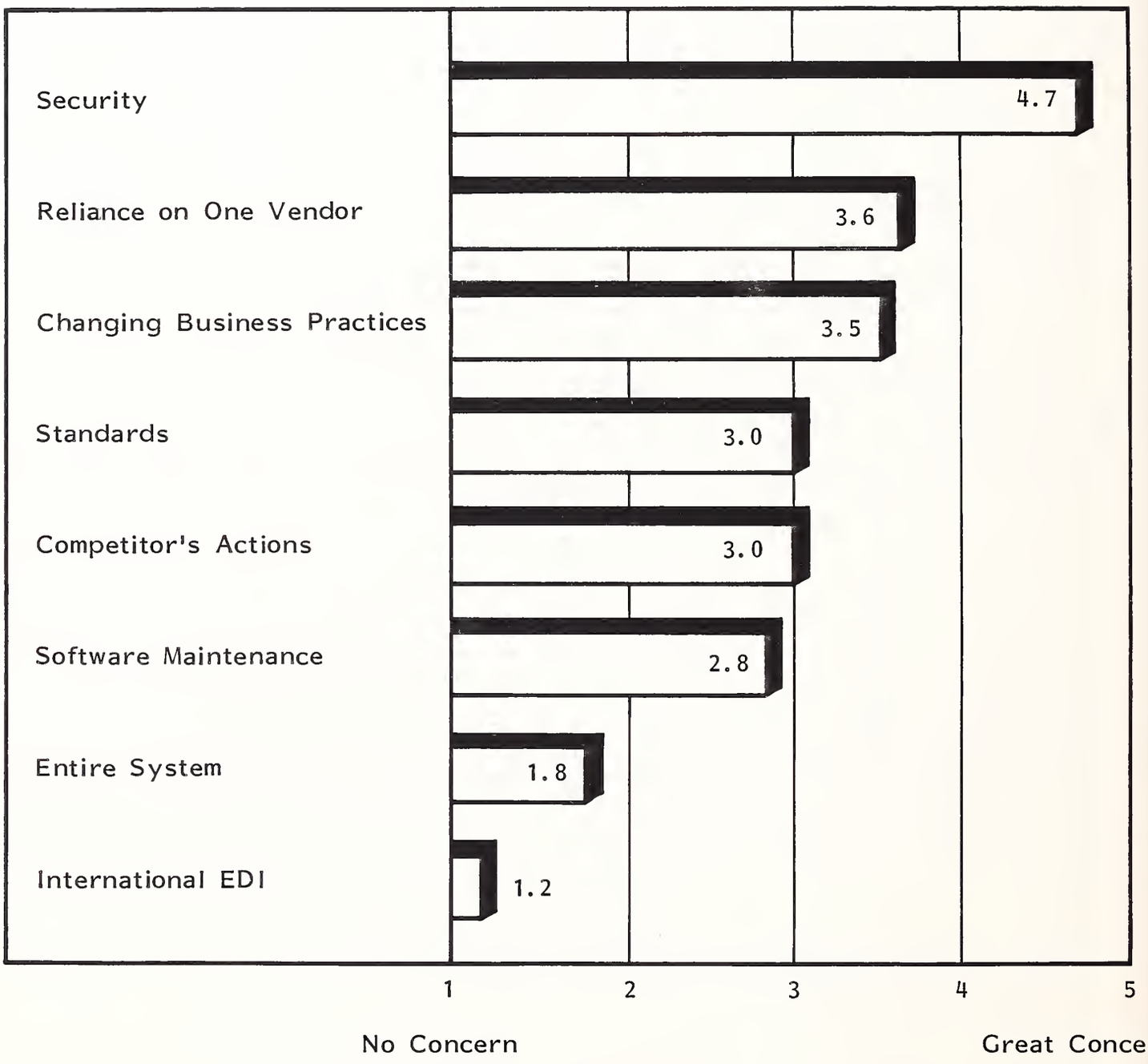
- While EDI will tend to reduce the number of physical paper documents, it may make possible better hardcopy reports. The net gain or loss in paper consumption is presently difficult to estimate.

K. BANKS ARE LARGELY MISSING FROM EDI

- A missing piece of the EDI puzzle is the banking industry.

EXHIBIT IV-3

USER EDI CONCERNS



I. AUTOMATED CLEARINGHOUSES

- Currently, the float time between payment authorization and the actual transaction is inconsistent under normal check clearing procedures. More accurate pinpointing and control of funds transfer will be beneficial to trading parties.

- Most transactions passing through electronic automated clearinghouses (ACH) payment systems are comprised of consumer transactions such as direct deposits.

- In 1983, the National Automated Clearinghouse Association (NACHA) established a unique format for these payments which is derived from ANSI X.12 standards, but is not fully compatible with any industry EDI standards or with Bank Wire, SWIFT (Society for Worldwide Interbank Financial Telecommunications), or other organizational formats specializing in money transfers.

  - NACHA has been criticized by EDI advocates for this lack of compatibility.

  - The NACHA corporate trade payments program has not been successful partially due to incompatible formats.

  - Currently, use of NACHA formats for electronic payments requires a system separate from EDI transactions. Information may be passed to banks in X.12 standards and translated to NACHA standards for communications between banks.

  - X.12 standards are more complex than NACHA and future compatibility will require NACHA standards expansion.

- There have been actions indicating this problem will eventually be solved.

- American Standards Committee X.9 (Banking) has held discussions with the ASC X.12 committee and NACHA board representatives to develop payment data requirements so X.12 standards can be used for data interchange transactions responsive to needs of banking and corporate customers.

- Remittance/payment transaction sets are nearly complete and work is progressing on data dictionaries for electronic funds transfer (EFT) linked to EDI.

- The Bank of Boston does provide an EDI service for freight bills transmitted by a third party.

  - These documents are matched for payment by the bank's freight payment operation.

  - Data can be electronically submitted to a user's in-house computer for analysis and management reports.

  - The sytem is designed to reduce freight billing and payment operations and is recommended for shippers or motor carriers with over 500 monthly freight bills.

  - The system requires 4800 baud dial-up lines.

  - It uses software developed by TranSettlements.

- Other banks provide freight payment services which do not currently link to EDI.

- Electronic funds transfer will eventually be added to EDI, and several of the third parties questioned by INPUT indicate they are being actively solicited to

enter strategic alliances with banks. It is possible banks will emerge from providing basic financial services to competitive positions in EDI.

- An EDI-like product called BESS is available from Data Architects (Waltham, MA), supporting electronic funds transfers between institutions using different data formats.

2. BANKS AND INTERNATIONAL TRADE

- International financial insitutions are closely involved in international trade through credit instruments.

- Banks are very interested in further involvement in EDI, but few have demonstrated clear perspectives on how to proceed because of reluctance to extend their services to the international trade business itself rather than merely negotiating payments.

- Several banks have recently developed programs to offer aggressive services, and a vision of their involvement is growing.

  - Chase Manhattan Bank is believed to be investigating bank/EDI implementations.

  - GEISCO, which was selected by NACHA to provide ACH services, is holding discussions with unidentified international banks for similar services as are other VAN services.

  - Strategic partnering agreements covering Bank/EDI international activities are expected late in 1985 or early in 1986.

L. COSTS

1. NETWORK AND TRANSACTION COSTS

- Network costs of EDI become relatively inconsequential when compared to costs of paper transactions.

- Third-party vendor fees are still slightly higher than comparable electronic mail, but these fees will drop as development costs are recovered and volume and competition increase.

- Users were asked to provide their estimate on the cost per transaction which would make converting from current systems to electronic systems worthwhile.

  - Most users provided cost ranges between $0.50 and $1.00. When including associated data entry, this increases to a $3-12 range.

  - One knowledgable user said that any transaction expense below $50 would make EDI worthwhile. This is the estimated average cost of handling a paper transaction.

- Most VAN and RCS services charge $0.50-1.00 per 1,000 characters. Volume discounts reduce these fees to $0.15 per 1,000 characters in some cases. Some also levy monthly service charges of $100-200 and connect charges.

2. START-UP COSTS

- Users initating EDI will incure minimal costs equivalent to the price of a microcomputer and associated software.

- This does not include the costs of customizing software or writing interfaces to existing applications.

- Based on the estimated value of time spent in handling routine paperwork which could be migrated to EDI systems, one small retailer interviewed was willing to invest in a microcomputer system costing approximately $7,500, which could be cost-justified within three years on the savings resulting from EDI alone.

- Large users indicated they would be willing to invest considerably more (up to $500,000) to implement EDI. Such installations would typically involve larger system processors and software and a great many more transactions.

3. WHO PAYS?

- Most EDI third-party services permit billing to be split between trading partners based on processing services and translations provided.

- Proprietary systems can similarly be designed to allocate costs to the most appropriate party.

  - For example, the costs of transmitting a purchase order rightly belong to the issuer, while electronic invoicing costs should be borne by the supplier.

  - Larger companies may subsidize smaller customers' EDI expenses.

4. WHO CONTROLS?

- Users interviewed were split almost equally between those who would prefer to operate an EDI system themselves and those who would prefer to use a third-party service.

- The reasons given were related to a company's ability to manage and operate the system and the belief that a third party is the most efficient means to communicate with many trading partners.

- Those wishing to operate their own system were typically large companies wanting to bind their customers closely to them or those needing to communicate with only a few corporate subsidiaries or affiliates.

- Few companies interviewed were willing to use another company's EDI system.

- The next chapter describes the status of EDI in several industries, discusses EDI markets, and analyzes the strategies of current market participants.

V ELECTRONIC DATA INTERCHANGE MARKETS AND STRATEGIES

V ELECTRONIC DATA INTERCHANGE MARKETS AND STRATEGIES

A. INDUSTRY ACTIVITIES

- A number of industries have or are in the process of implementing EDI systems. This section profiles activities in several of these segments to provide indications of market maturity.

1. DISCRETE MANUFACTURING

a. Automobile Manufacturing

- The auto industry is attempting to recover from losses due to competition from off-shore (principally Japanese) auto makers.

- It is adapting technology for quality control improvements and cost reduction, and also is providing for differentiated products by using technology in automobiles since mechanical innovations are now less possible.

- The industry is a pioneer in EDI, with proprietary but incompatible systems having linked suppliers to major automakers for approximately 10 years.

- Auto industry EDI usage is particulary important since its estimated 35,000 suppliers represent virtually every industrial segment. EDI use in this industry will lead to more usage in other industries.

- The leading advocate and coordinator for using technology is the Automobile Industry Action Group (AIAG), a non-profit trade association representing U.S. and Canadian suppliers and manufacturers. AIAG is establishing EDI standards linked to X.12, has published a number of transaction sets, is monitoring software development, and offers training seminars.

- When coupled to Just-In-Time (JIT) inventory management techniques, EDI becomes a potent cost reduction tool.

  - JIT describes parts manufacture immediately prior to need, thus reducing inventory costs.

  - It also requires suppliers to implement production changes quickly. EDI supports such speedy changes.

  - EDI is credited with reducing the manufacturing costs of an automobile by $100-200. When coupled to other productivity measures such as JIT, standardized bar coding, reusable plastic containers, and stabilized scheduling, manufacturing costs can be reduced an estimated $500 per car.

  - AIAG officials expect auto industry documentation to be approximately 90% paperless by 1988-1989.

- While individual automakers have used electronic means to transmit orders to the largest vendors for over a decade, these systems use unique formats. The AIAG hopes to reduce the hundreds of forms auto companies use to order, ship, and confirm to about 18 by 1986. Accordingly, documentation standards are being established.

- Several auto makers are now requiring suppliers to use EDI, giving momentum to its use. For example:

- General Motor's most critical suppliers will only be able to communicate with the automaker by EDI by the end of 1986.

- Ford Motor Company is upgrading its Supplier On-Line Managemement Information System to allow several thousand suppliers to send electronic shipping information.

- Chrysler Corporation has set a goal of receiving 25% of its parts suppliers' invoices by EDI.

- Problems remain to be addressed by the AIAG.

  - The current standards are based on the requirements of the largest automakers, resulting in redundancies and some lack of uniformity, even between divisions of the same automaker.

  - These problems, if not resolved, may lead some suppliers to add surcharges to their invoices to cover the costs of providing redundant data.

  - Automaker's private EDI networks are designed for fixed length formats while the X.12 standards call for more flexible structures.

- Future automotive industry EDI enhancements will support the interchange of engineering drawings between automobile designers and suppliers.

b. Electronics Industry

- The industry has adapted X.12 into its "EDX" standards sponsored by the National Electrical Manufacturers Association, the National Association of Electrical Distributors, and the National Electrical Manufacturer's Representatives Associations.

- Several larger electronics firms (e.g., RCA and Hewlett-Packard) have implemented EDI systems of using third-party transmission networks. RCA is reportedly enhancing its system to use modified X.12 standards.

- An earlier industry system called ESCORT, promoted by an industry group and managed by Control Data, fell into disuse because electronics distributors and not manufacturers or customers were involved in its design. It was also cumbersome to use.

2. PROCESS MANUFACTURING

a. Paper and Pulp Industry

- The paper industry traditionally has been resistant to change, but there is significant activity toward EDI as a means of improving productivity.

- Many of the larger paper companies sell directly to large end users. Proprietary networks are not seen as an efficient solution because they require a large number of nodes on private, multi-point network. Some interviewed users feel it is advantageous to have industry endorsement and specifications allowing use of one network and one format for communications.

- Because of this need, the Graphics Communications and Computers Association, in association with other paper industry associations, issued an RFP for a system based on the EMBARC specification (Electronic Manifesting and Bar Coding) for better order tracking.

  - EMBARC is a specification for a shipping document.

  - It integrates with bar coding standards.

- Upon publication of the specification, participants recognized that the point-to-point connections originally envisioned would create problems.
  - Each computer system would need to maintain translation tables.
  - Participants have different communications protocols.
- A store and forward system providing translation would solve these problems.
- The specification was modified and a task force formed to evaluate transmission vendors and data store and forward services (i.e., EDI).
- The association will issue an industry endorsement of the selected vendor.
- The endorsement strategy is being taken for several reasons:
  - The association does not feel it is in a position to establish the standard.
  - It is concerned about antitrust implications.
  - It feels it should not lock the industry into one vendor which would prevent competitive benefits such as providing high service levels, competitive pricing, and encouraged innovation.
- The American Paper Institute, along with other industries, is a member of the ANSI X.12 committee which is developing standards for EDI.
- Several paper and pulp manufacturers have developed proprietary on-line systems which will evolve into fully developed EDI systems.
- Hammermill (Erie, PA) has HAL, the Hammermill Access Link connecting 174 of their largest distributors.

- The sytem (developed in 1983) is hosted by an IBM 3083 running in a VM environment, initially using remote 3270-type terminals.

- Micro-based terminal emulation is also supported for an on-line, real-time system.

- Only particular files can be accessed.

- Only reports possible with terminal emulation can be generated.

- HAL links to the company's order processing application package called HILITE with modules for order entry, invoicing, shipping information, and other features.

- HAL uses X.12 specifications.

- HAL replaces an older, inflexible on-line system which fell into disuse and was subsequently abandoned.

- HAL will pilot and eventually be upgraded to full EDI capabilities pending an industry-wide, third-party vendor endorsement. Hammermill is on the industry task force evaluating EDI proposals.

- HAL will evolve to provide computer-to-computer links and will add additional features for management information services such as tracking, market studies, and analysis of distributor performance to help merchants understand their performance better. Hammermill found that end users wanted shipping manifest information.

- The purpose of HAL and future enhancements is to supply electronic information and increase productivity. Customer support is an important business service. The HAL manager reports fewer customer service calls from those

using HAL, and those that do call are more informed in their queries. User satisfaction is high.

- Other paper manufacturers have, or are developing, similar on-line systems.

b. Iron and Steel Industry

- The American Iron and Steel Institute has established standards for 46 steel industry products.

  - The Steel Customer Communications System (SCCS) is designed for micro use and features an English language interface.

  - Industry EDI involvement is in the preliminary stages, with increasing activity expected in 1986.

- The Institute reported that of 24 companies surveyed with data processing departments of five or more, 19 reported inquiries from customers about EDI.

3. TRANSPORTATION INDUSTRY

- The transportation industry is subsegmented into motor, rail, air, and ocean carriers.

- The rail and trucking industries have experienced slowing business, partially as a result of general economic softness. Income and tonnage fell sharply in 1985.

- Deregulation is causing rapid obsolescence of existing systems. To remain viable in the new environment, transportation firms are placing increasing emphasis on computerized system to improve their competitive edge.

- INPUT projects spending for processing services in the transportation segment to grow 13% annually, bringing demand to $290 million by 1989. Software applications are growing at an average annual rate of 41%, with the market growing to $650 million by 1989.

- According to INPUT, 91% of the transportation companies surveyed expect their IS budgets to increase, with an average growth rate of 9%.

- Although the rails generally develop industry applications internally, major opportunities exist to assist large transportation vendors in extending information systems capabilities to encompass intermodal distribution. Although the number of such possible sales is small, their potential value is large.

- Expertise gained in one delivery mode may be leveraged into sales to the more numerous, smaller companies operating within only one service mode.

- The most serious problems identified by transportation IS managers are planning and control.

a. Railroads

- Railways have launched cost cutting programs, reducing employment.

- The rail sector is highly concentrated in a few large organizations, with 98% of rail ton-mileage and 92% of railroad employment accounted for by 32 of the largest railroad carriers (those with revenues over $50 million).

- Deregulation has allowed rails to acquire motor carriers regardless of whether or not they provide auxiliary or supplemental service as was previously required.

- Rails can make rate changes more easily and rate and service contracts with shippers are now allowed.

- Rails are emerging as transportation conglomerates. Eleven of the largest have trucking affiliates and three others own trucks as part of rail piggyback services.

- Railways were one of the first industries to use EDI technologies.

  - Individual companies have access to the technology due to their size relative to other industries.

  - Every major rail company has extensive computer and communications facilities and has excess capacity able to handle the needs of companies outside the industry.

- The railroad industry is an interesting EDI participant for several reasons.

  - Its rights-of-way are being used for telecommunications networks, including microwave and fiber optic systems, for both internal use and resale.

  - The industry deals with shippers in various industries.

  - Its own internal messaging has grown from a reported 4,500 to nearly 100,000 daily since 1980.

- Although several companies provide information services to the rail industry, Kleinschmidt appears to be the leader in EDI, although Railinc, a subsidiary of an industry association, and TranSettlements also provide services. See the profiles in this chapter, Section C, for more information on these companies.

- An estimated 80-90% of railroad waybills are handled electronically while other documentation statistics are lower. However, much of this traffic is intra-company, and therefore does not fit the definition of EDI.

b. Trucking

- The trucking sector is the most fragmented in the transportation industry. It's thousands of firms vary from single owner/operator shops to nationwide, long-haul carriers.

- Trucking sector revenue growth has been eroded by competiton in a newly deregulated environment.

  - Price cutting competition is greatest between unionized and nonunion carriers.

  - Many unionized carriers have established nonunion subsidiaries to compete for "less than truckload" business.

  - This creates needs for complex billing, tracing, and detail operations. When linked to EDI applications, these operations create needed efficiencies.

- TranSettlements is the primary vendor of EDI services to the motor transportation subsegment.

- Trucking companies have been slow to use EDI due to financial constraints and a lack of computerization. New, less expensive computer systems are paving the way for such applications.

- Readers requiring more information on the industry are referred to INPUT's study Information Services - Vertical Industry Markets, 1984.

c. Ocean Shipping

- Most of the paperwork in this industry emanates between shippers and forwarders.

- Shippers have not been aggressive advocates for EDI, but carriers are beginning to recognize that the benefits are worth pursuing.

- Many shipping companies provide on-line services for rate quotes, freight bills, manifests, trace shipments, and billing. Some support data analyses for management reports.

4. MEDICAL INDUSTRY

- There are private EDI-type systems in the medical arena as well as evolving sytems providing for fuller acceptance of standardized formats. These will eventually provide EDI translations of disparate document formats.

- American Hospital Supply, a manufacturer and distributor of medical equipment, offers the ASAP (Analytical Systems Automated Purchasing) system which allows customers to use terminals, touch-tone phones, portable terminals, bar code scanners, and processors of all sizes to enter orders.

  - Over 500,000 products are available to some 5,000 customers.

  - Messages and special requests can be sent to customer sales representatives.

  - The system can translate between a customer's stock numbers and AHS's order numbers and can provide documentation sorting and customized management reports.

- Optionally, the system can automate ordering with the ASAP computer compiling a list of recommended purchases for electronic approval.

- ASAP is extended to American Hospital Supply's suppliers.

- ASAP saves the vendor an estimated $6 million annually and is credited with helping the company achieve market dominance.

- Services for the medical insurance industry are provided through and by General Electric Information Services network. See the GEISCO profile, this chapter, Section B for more details.

5. RETAIL/WHOLESALE DISTRIBUTION

a. Grocery Industry

- The industry is fast adopting advances in technology right down to the checkstand as a way of optimizing profit margins measured in fractional percentages.

  - Scanners reading universal product codes provide instant data on buying patterns.

  - Accordingly, chain stores are able to place more emphasis on specific supply needs for individual stores.

- This has changed industry relationships. In the past, retailers were primarily selling agents. Now, they have more control over choosing the products being sold due to improved information.

- Industry buyers issue some 15 million purchase orders annually. These documents trigger a like number of bills of lading and invoices, along with other documents such as adjustments, product announcements, and allowances.

- The total of this traffic is estimated in excess of 100 million messages between 2,000 distributors, 5,000 manufacturers, and 2,000 brokers. Accordingly, industry participants view the grocery and distribution industries as prime candidates for EDI services.

- The grocery industry has been gradually adopting EDI services after a consulting firm predicted the industry could save between $196 million and $324 million if only half of all transactions were done electronically.

- The Uniform Product Council, the agency behind adoption of bar code standards, is the principal industry EDI coordinator. Its efforts have resulted in the Uniform Communications Standards (UCS).

- UCS services are available through McDonnell Douglas' EDI-Net, GEISCO's Mark-Net, Informatics General's Ordernet Services, and proprietary networks.

- General Mills has set up an EDI network to link supermarkets with the company for invoicing.

  - The company had a private network from its headquarters to plants and sales offices. However, this was deemed unsuitable for EDI.

  - Tymnet was contracted to provide EDI networking services. Twice daily, General Mills' computers send out invoices which are converted to the UCS format by Tymnet before delivery to supermarkets.

  - Future enhancements include using the network to distribute other information to supermarkets such as upcoming promotions and ad campaign details.

- Infomatic General's Ordernet was endorsed by the National-American Wholesale Grocers Association (NAWGA) to support UCS formated informa-

tion to suppliers. EDI, Inc.-supplied software (further described this chapter, Section D) is used to reformat data to UCS standards.

- Order entry can be keyed into a menu driven system, or a micro workstation can reformat directly from an existing file.

b. Office Products

- The Industry Committee on Office Product Standards (ICOPS) is a joint project of the national Office Products Association and the Wholesale Stationer's Association.

- EDI research began in 1983, and EDI piloting began in 1985 using GEISCO and X.12 standards with additional data elements for specific industry needs.

- The pilot program consisted of three phases:

  - Phase One tests basic message switching and mailboxes.

  - Phase Two adds validation to confirm that that transmission follows standardized formats and conventions.

  - Phase Three tests translation between the user's internal formats and network data conversion to EDI standards.

- Compliance with ICOPS is voluntary.

B. VALUE ADDED NETWORK SERVICES

- Although EDI is accomplished on VAN processors, INPUT differentiates services offered through VANs and those provided by "standalone" RCS

vendors. Admittedly, the differences between VANs and RCS are becoming less clear.

- VANs have exhibited activities directed primarily at generating network traffic rather than providing processing services or software and equipment sales.

- The VAN segment of the EDI market is dominated by McDonnell Douglas Corporation's EDI-NET and General Electric Information Services Corporation's EDI Express. IBM's Information Network has EDI capabilities with an on-line translation program available to users, and AT&T is also offering interchange services, both on its own and in cooperation with Control Data Corporation.

I. MCDONNELL DOUGLAS CORPORATION - EDI NET

- EDI-NET, introduced in 1981, supports mailbox and out-dial services using TDCC, X.12, international TDI, and UCS standards.

- In 1984, McDonnell Douglas purchased Tymshare and its VAN, Tymnet. These newly acquired companies have been placed in the Information Services Group and renamed Tymnet McDonnell Douglas Network Systems. EDI is provided by the McDonnell Douglas Electronic Data Interchange Systems Company, one of approximately 40 within the group.

- EDI services are currently being provided to the grocery, transportation, electronics, communications, oil, warehousing, and other industries.

  - No "log-in" service is provided in accordance with UCS standards. This permits non-customers to access EDI Net customers who are trading partners through the network; the subscribers pay the charges.

  - There are over 540 domestic and 65 international access points.

- In 1985, the company tripled personnel support for the EDI development and marketing to a staff of approximately 75.

- In 1986, it will upgrade its central processors from IBM mainframes to Tandem fault tolerant computers.

- These technical improvements will support additional EDI services such as transaction totaling and extensive management reports.

- A company spokesman says the company had higher revenues in October 1985, associated with EDI NET, than in all of 1984.

- In addition to network and processing services, the company claims distinction in providing EDI consulting services as part of what it calls full service. Further, it says its services are "open," rather than "closed" to a few industry segments.

- The company's strategy is to recruit companies representing many industries to its EDI services, with these companies in turn drawing trading partners to the network for data interchanges. This contrasts with the strategies of other VANs who have taken a more targeted approach.

- McDonnell Douglas was the exclusive marketing agent for Metro Mark Integrated System's EDI software which operates on IBM minis and PC/XT and PC/AT micros, but this agreement has lapsed. It maintains a working relationship with EDI, Inc., whose software is incorporated in the overall translation services provided.

2. GENERAL ELECTRIC INFORMATION SERVICES

a. MarkNet

- The first to offer computer timesharing, GEISCO now operates the world's largest commercial teleprocessing network.

- For its EDI services, GEISCO works with industry groups to develop alliances and win endorsements. The company operates a general purpose EDI network and a medical insurance claims service, and developed a manufacturing EDI network for an industry group.

- In 1984, GEISCO spent $200 million upgrading equipment, with another $80 million spent in 1985.

- As did many information service companies, GEISCO experienced difficulties during 1985, resulting in staff cutbacks.

  - The company announced the cutbacks were part of a restructuring leading to a tighter business focus.

  - GEISCO's plan is to leverage the worldwide network presence and to focus on selected cross-industry applications. GEISCO has defined "focused markets" as including EDI itself, business logistics (or the movement of goods and materials), and international trade.

- GEISCO's EDI Express System is operated as part of the Mark III teleprocessing service with approximately 750 access points worldwide. It supports X.12, TDCC, international standards, and private formats. Access via asynch and bisynch protocols are supported, and mainframe access is via 2780/3780 protocols.

- EDI Express provides mailbox service or optional out-dialing. Billing can be shared by trading partners.

- Several microcomputer software packages are available, some providing menu driven communications and form-fill screens.

  - GE Link was developed by EDI, Inc. The other packages were developed by the vendor.

  - Micros can be configured to work with larger host (mainframe or mini) computers to permit translation from internal, private standards to public standards.

  - Dumb terminals can extract reports, but cannot do transactions.

- The support program is called Quick Connect and includes documentation, training guides, and network software with which users define their EDI environments and implement or change the communications parameters used with trading partners. There is a toll-free EDI help desk.

- GEISCO's Quick Comm E-mail supports electronic document translation in addition to messaging.

- GEISCO developed Transnet for the Motor and Equipment Manufacturers Association (see this chapter, Section C), and operates a health care claims clearinghouse, accessible by microcomputers.

- GEISCO also supports a third party's health care claims clearinghouse and operates its own service for non-members of that clearinghouse.

b. National Electronic Information Corporation (NEIC)

- NEIC has selected GEISCO as the processor for its national clearinghouse of health care insurance claims.
  - NEIC, based in New York, enables health care providers and/or billing services to submit electronic claims to 40 private, commercial insurance companies.
  - Claim data from NEIC members is accepted in a single standardized format, uniform across member carriers.
- According to company officials, NEIC's claim volume was increasing at the rate of 30% monthly, requiring a larger, more sophisticated network.

c. GEISCO's EMC Express

- EMC Express is a service which electronically collects and distributes medical claims for non-members of NEIC.
- Two formats are currently supported:
  - The hospital industry's UB 82 (for Uniform Billing Committee), a paper format established in 1982 and used in most states.
  - The physician's claim form called HCFA 1500 (for Health Care Finance Administration, a department of the U.S. Health and Human Services Agency which administers Medicare).
- Currently, only standard document formats are accepted by the two medical insurance services operated on GEISCO's network.

- GEISCO does offer software customization on network or user processors for translations between electronic formats in an EDI emulation.

- GEISCO is active with health care insurance providers in establishing industry EDI-type standards, similar to X.12 standards, for submission to ANSI for health care insurance industry acceptance.

d. Comments

- GEISCO's corporate philosophy is that the company will not enter any business where they cannot achieve number one or number two position in that business.

- GEISCO's processing business may have suffered, but the company is taking steps to reduce expenses while focusing on opportunities which will make best use of its resources.

3. IBM - INFORMATION NETWORK (IN)

- The Information Network was developed in Europe as a remote computing service. In 1982, it was transferred for U.S. operations as an indpendent business unit (IBU) within IBM, offering SNA networking and remote processing services.

- Two services are offered:

  - Network Services for linking a customer's mainframes and terminals in a managed network environment.

  - Information Exchange, which provides store and forward and other value added services.

- IN hosts Ad/TRACs (Advanced Transaction Rearrange and Conversion System) developed by Advanced Technology Systems (Norcross, GA) within IN's Information Exchange store and forward services for EDI applications.

  - Ad/TRACS requires users to define input and output from the network in advance. The tool used is the On-Line Definition Facility.

  - Messages are intercepted and converted by the In-Flight Transaction Module.

  - This is more intelligent than table conversions as it supports sub-routines such as calculations, combinations, date computations, conditional selection of data or records for processing, and use of conditional logic.

  - It is available on Insurance Communications Services and, more generally, within Product Information Exchange Services.

  - Communications protocol conversions are handled on the network (rather than on IN's central processors) where bisynch or asynch protocols are converted from and to the backbone network's SNA protocol.

- IN's Insurance Communications Service was selected by the Insurance Research Institute (IRR) to perform protocol conversions for up to 70 types of terminals and processors of independent insurance agents and corporate underwriters and also to provide message switching and processing at volume discounts.

  - The resulting Insurance Value Added Network Service (IVANS), operated by a separate company established by IRR, uses IBM's service supplemented with customized facilities and supervisory and support services.

- Independent insurance agents can directly access a carrier's computers.

- Other industry users of IN's EDI capabilities include chemical, textile, automakers, medical insurance applications (a doctor can access an insurance carrier), and electronics firms.

- In electronics, parent company IBM is using the network to communicate with suppliers.

- IBM has taken steps toward greater communications capabilities (the purchase of Rolm and part of MCI are representative of this) and the company is aggressively pursuing VAN opportunities. However, IN has some limitations for its potential customers.

  - IN appears is unfocused and expensive to use.

  - The synchronous nature of the backbone network is more suited to mainframe-mainframe communications than micro-to-host communications.

  - It appears directed at large, dedicated IBM users, permitting use of applications such as program development languages, office systems, decision support, and graphics.

  - It can also serve to expedite pre-installation testing and planning of ordered large-scale equipment and software, thus serving to increase sales.

  - IN was upgraded in 1985 to improve large users' abilities to connect their SNA network, use network based applications, and link with other customers.

- However, IN is available in only a few cities representing a majority of large mainframe customer installations.

- IN does connect to Telenet for off-net access. Rather than extend the network geographically, this type of third-party approach, or using the facilities of partly owned MCI, is the probable future direction of any Information Network expansion.

- IBM has EDI services available, but it does not heavily promote this fact. Its marketing literature only mentions EDI in passing.

- IBM will not become a dominant EDI service unless it wants to be. The company is quite capable of meeting demands for EDI services from its customers and is well positioned to enter any number of vertical markets.

4. AT&T INFORMATION SYSTEMS NET 1000 INTERCHANGE SERVICES

- Net 1000 is focused as a network for intercompany communications and, specifically, to connect private networks.

- AT&T is developing applications for mortgage bankers, and company officials report investigating buyer and seller problems in various industries suitable for automation (i.e., EDI).

- Services are being supplied to the steel, automotive, and electronics industry.

- Supply Link provides "one call" access to the major automakers for the electronic exchange of certain documents.

  - Software is designed to GM, Ford, and Chrysler formats and will be refined in the future to support evolving AIAG standards.

  - Turnkey systems, based on AT&T micros, are available.

- The Interchange Service is used to distribute product catalogs to potential customers and permits orders to be entered into system mailboxes.

- In October 1985, AT&T asked for FCC permission to offer Interchange Services which use AT&T Information Systems processing facilities on an unseparated basis.

  - It is said that discontinuance of the service was possible and that viability of a separate subsidiary was in question.

  - These requests follow FCC relaxation of separated subsidiary rules, now permitting AT&T equipment and communications services to be sold jointly.

- AT&T's Accunet Packet Service will be used by Control Data Corporation for an EDI service called Redinet (see CDC profile below).

- AT&T is technologically well positioned for EDI services either on its own or through strategic partnering, but is still overcoming its predivestiture mentality in marketing.

  - Observers at rival firms report AT&T is usually involved in the early stages of major contract bidding but often fails to follow through.

  - Several calls to AT&T by INPUT were required to obtain any information about the service.

  - Problems such as these should be short term as the company improves its internal marketing management systems.

5. CONTROL DATA CORPORATION'S REDINET

- CDC's Redinet Intercorporate Business Transaction System EDI mailbox service was announced in late 1984 and introduced in spring 1985 under a joint marketing agreement with AT&T.

  - The system uses AT&T Communication's family of data transport services including the Accunet Packet network.

  - The software was developed by Program Sciences Incorporated (PSI - see profile in Section D below).

  - Control Data handles processing, installs and maintains customer premises equipment, and administers the software through an arrangement with PSI.

  - It is targeted at any X.12 standard users and has received endorsements from the American Supply and Machinery Manufacturers Association, National Industrial Distributors Association, and Southern Industrial Distributors Association.

  - The system validates document formats and handles conversions and translations.

- Control Data has also proposed a Network Transfer Service as an EDI clearinghouse (see Chapter VI, Section B for more information on NTS).

- Control Data has reported heavy losses and there had been earlier speculation of an AT&T takeover of CDC which failed to materialize.

- CDC was also involved with United Telecom's Uninet Inc. subsidiary for research and development associated with the Uninet II second generation packet network.

C. OTHER REMOTE COMPUTING SERVICE COMPANIES

- RCS provides similar services to VANs, but the smaller ones, including those now involved in EDI, usually do not operate a network themselves. Access may be through one of the VANs, direct dial-up lines, or through 800 numbers provided by the service bureau.

- Most of the services profiled have specialized in one industry, and some are directly competitive with one another as well as with VAN services.

1. INFORMATICS GENERAL CORPORATION

- Informatics, a processing, professional services, and software vendor (Columbus, OH), provides EDI to several industries under the name of Ordernet Services.

- The company began serving the pharmaceutical industry in 1975 with Comm-Net, and now serves several industries which have adopted ANSI X-12 standards. Approximately 600 clients and customer locations use Ordernet.

  - The American Hardware Manufacturers Association (AHMA) chose Informatics to provide the EAGLE automated purchase order entry system, which now functions as part of Ordernet.

    . Operation and marketing of services is handled under a licensing agreement with the AHMA subsidiary American Hardware Data Systems, Inc.

    . AHMA managed system funding, development, and testing.

  - Electronic transmission of hospital chargebacks between wholesalers and pharmaceutical manufacturers is available, using National Wholesale Drugists' Association (NWDA) formats.

- Informatics also offers a Micro Workstation based on IBM PCs, XTs, ATs, or compatibles and distributes Telink software from EDI, Inc.

- Auto-Comm for the U.S. auto industry is for order and supply documents and distributes software from Qaid Automotive Systems, Ltd. (Milton, Ontario) which conforms to AIAG recommended specifications.

- EDI-UCS service is supplied to the grocery industry, Direct Order Entry (DOE) is supplied to service merchandising companies, warehousing service is provided using WINS standards, and the company is initiating services to the transportation industry using TDCC standards.

- Ordernet is a mailbox service (called a "clearinghouse" by the vendor), acting as a central repository of documents being transferred between distributors and manufacturers. Automatic forwarding is also available.

- The service supports most asynchronous and bisynchronous devices, and communications is handled through a toll-free number. The company feels this provides it with access from virtually all locations without dependence on packet network nodes.

- Manufacturers need to modify their software with a small utility program to recognize standard record layouts and reformat them into company document formats for internal processing. Distributors need to reformat their documents as specified, in most cases using vendor item number identifications.

- Ordernet processors can handle incompatible line speeds, communications protocol differences, and industry-specific format conversions.

- Control reports are generated by the system. Customer directories are published by the vendor.

- A one-year service agreement is renewable on a monthly basis after the first year. There is a startup fee to defray initialization and testing costs. Monthly base fees, processing, and connect time charges apply.

- The company claims growth of 70% over the last five years in EDI services. An announcement with a major money center bank for a strategic alliance linking EDI to funds transfer is expected.

- Due to its relatively early entry into EDI services, Informatics holds a major portion of the market based on numbers of customers.

- There will probably be changes in the future due to the purchase of the company by Sterling Software, which reportedly will involve restructuring as corporate staffs are consolidated. There had been earlier speculation that portions of Informatics may be sold to improve earnings.

2. KLEINSCHMIDT

- Kleinschmidt (Deerfield, IL), a division of SCM Corporation, is a third-party organization (remote computing service) which has been operating for seven years.

- Its EDI mailbox services are provided to a cross-section of industries including grocery and food processing, warehousing, chemicals, petroleum, consumer products, forest products, brokerage firms, distributors, and rail and trucking carriers.

- It began with services to the rail industry and receives some transactions from Railinc at the customer's request for higher level management report and other capabilities than that service provides (see next profile for more information on Railinc).

- Translation services require users to provide the company with proper data mapping to enable conversion of data into transmittable standard formats.

  - The company takes the unique approach of not supporting specific industry standards.

  - Rather, Kleinschmidt accepts and translates a customer's existing formats while other third parties require customers to adopt industry standards.

  - Adopting standards, according to Kleinschmidt, can be a fairly major effort. Because it does not require this, it claims certain competitive advantages.

- Customers can dial the service via asynchronous or synchronous communications protocols, directly, or through 800 numbers. Alternately, Kleinschmidt will call the customer's computer on a prearranged schedule, and customers can access the service through Tymnet.

- Kleinschmidt's parent firm (SCM) is being purchased, and Kleinschmidt may become a separate entity in a management buyout.

- Due to its small size, Kleinschmidt pays more attention to a customer's needs and can provide better service than a larger vendor. It will also recommend to potential clients that they use several vendors to compare service and also to reduce reliance on one service.

3. RAILINC CORPORATION

- Railinc (Washington, DC) is a wholly owned data processing subsidiary of the Association of American Railroads (AAR) which provides information and communications services. In addition to EDI services, it provides industry statistics, rate information, customized software, and computer timesharing.

- Railinc operates and maintains a private network called TeleRail Automated Information Network (TRAIN II) consisting of dedicated lines, dial circuits, and satellite communications to the primary computers of the major railroads.

- Linkages to VANs and other network participants are also provided. Some transactions submitted to Railinc are transferred to Kleinschmidt at the customer's request to take advantage of more sophisticated report generators and other features not available on Railinc.

- The two principal EDI products are SAM (Shipper Assist Message Service) for high volume needs and CARLO (Car Location Message Dial-In Service) for low volume needs. Both were developed by the AAR and the National Industrial Traffic League.

- Information exchanged covers car location messages (CLMs), waybills, administrative messages, and other messages between carriers and shippers. TDCC standards and those developed by Railinc are supported.

- Direct, full-time 2,400-4,800 bps, bisynchronous (3780) protocol connections are supported for timely information transfers for SAM, and toll-free dial-in service is used for CARLO. CARLO is a store and forward mailbox service.

- Twenty major rail carriers use these services and about 70% of interline waybills are exchanged on the network. Most major rails are expected on the network by 1986.

- Microcomputer communications software is available for IBM PCs and compatibles to allow communications with Railinc. Other developments planned include enhanced electronic mail (beyond the current short administrative messages now possible) and information on intermodal trailers and containers.

- Since it is a for-profit subsidiary, Railinc can pursue business opportunities for non-rail industries, but efforts will be directed primarily at rail customers. For example, Railinc is testing the applicability of TRAIN to manage automobile inventories for U.S. automakers. The big three maintain their own rail cars for transporting inventory between facilities.

- Railinc's communications and processing services work to make rail freight hauling more attractive than the alternative.

4. TRANSETTLEMENTS, INC.

- TranSettlements (Atlanta, GA) is an EDI communications organization supporting ANSI X.12, TDCC, AIAG, and other standards. It is owned by Transus (formerly Georgia Highway Express).

- EDI services are directed primarily at motor carriers, shippers, and service organizations in this segment, although it is seeking other transportation segment and general business opportunities. It is the major EDI service provider for the motor transportation industry.

- Inbound and out-dial services are supported at 4,800 baud, using IBM 3780 protocols, directly or through WATS/800 numbers.

- The four primary services cover freight bills, bills of lading, and remittance notices which can be sent directly to payment centers.

- The company provides software consulting and customization, and sells mainframe software called Set Generator/Set Interpreters. It is evaluating other software opportunities.

- The company's customers include approximately 20 motor carriers, 15 shippers and service organizations (including the Bank of Boston), and Railinc rail carriers as well as an air carrier for communications between transportation mode carriers (intermodal communications).

- TranSettlement uses Control Data Corporation's Network Transfer Service (NTS) and is setting up communications to Kleinschmidt to improve third-party communications.

5. TRANSNET

- One of the first electronic ordering systems was developed by the Motor and Equipment Manufacturing Association (MEMA). Called Transnet, the system operates on the General Electronic Information Systems Corporation Value Added Network (GEISCO).

  - Transnet is an order clearinghouse for 70 manufacturers and 3,000 wholesalers and retailers.

  - Transnet processes over $8 billion worth of orders annually, represented by approximately 40,000 monthly orders.

  - It has been selected by the Automotive Industries Association for use in Canada and by the Bearing Specialists Association for their members.

- Transnet ties company computers to MEMA's computers over GEISCO's network. Orders entered in the system are consolidated for forwarding to manufacturers.

- Exhibit V-1 lists the VAN and RCS EDI services and identifies the current principal industry users.

EXHIBIT V-1

VAN/RCS EDI SERVICES

	SERVICE	PRINCIPAL USERS
VANS		
McDonnell Douglas	EDI Net	Cross Industry
GEISCO	EDI Express on MarkNet	Cross Industry
Control Data	Redinet	Cross Industry
AT&T	Interchange Services	Mortgage Bankers, Auto-makers (Supply Link), Distributors, Private Corp-porate Networks
IBM - Information Network	Product Information Exchange	Insurance (IVANS)
RCS		
Informatics General	Ordernet	Cross Industry
SCM Kleinschmidt		Rail Transportation
Railinc		Rail Transportation
TranSettlements		Motor Transportation
Transnet		Motor and Machinery, Canadian Auto Industry

D. EDI SOFTWARE

- The EDI software market is represented by a handful of small companies which specialize in providing mainframe, mini, or micro software. Some of these firms are developing software for other processors.

- INPUT expects some of the small software companies to form strategic alliances among themselves and with larger software and professional services firms.

  - Larger firms can offer marketing expertise, extensive user support programs, and large customer lists beneficial to EDI software marketing efforts.

  - Some alliances may prelude later mergers and acquisitions of EDI software firms.

- This section profiles some of the company's active in EDI software. Prices, as available, and other information about the specific products can be found in Appendix B.

1. APL GROUP

- The APL Group (New Canaan, CT) provides EDI software for IBM PC, XT, AT, and compatible micros. The package, called APL Computer-to-Computer Document Interchange (ACDI) front-ends a host mainframe for translations and related EDI functions.

- ACDI is a generic package designed for virtually any TDCC/ANSI standard application.

- Marketing is targetted primarily to the grocery, transportation, and distribution industries where APL corporate members previously worked.

- However, the software is suitable for other applications, and accounts in the electronics and chemical industries are being pursued.

- Bisynchronous and asynchronous communications are supported, and report generators are integrated into the software.

- The company's micro strategy appeals to those seeking economical EDI solutions.

  - ACDI can cost 60-80% less than user-developed mainframe EDI software.

  - Installation and maintenance costs are said to be low.

  - The micro orientation supports migration to larger standalone systems or integration into a mainframe environment.

- APL's software is modular with four separate modes designed to allow cost-effective experimentation with different situations and data and to allow staged evaluation of EDI's impact on the business without interfering with existing systems.

- The modes are:

  - Tutorial for training and demonstration. Communications are simulated. The tutorial gives potential users prototyping experience.

  - Mainframe Test Mode allows experimenting with two-way host system communications, but without external correspondent document exchanges.

- Correspondent Test Mode supports external communications but not host communications.

- The Operational Mode is a fully operational system.

- APL provides mainframe customization, but this can be done by the user with a set of standard, adaptable, fixed-length interface records.

- Value added network marketing agreements are being investigated.

2. EDI, INC.

- The Odenton (MD) company is the leader in micro-based EDI software based on installations, with versions for IBM, AT&T, Zenith, Sperry, NCR, Victor, and Honeywell micros.

- The software is called Telink and can serve all TDCC and X.12-derived applications. Users are required to develop or acquire translation tables referenced by the software. The company developed the TDCC software package, and Telink is compatible with it.

- The software can be standalone or serve as a front-end to a host computer.

- The company has also licensed its software to GEISCO. GE-Link has a different menu interface than Telink but otherwise is the same.

- EDI, Inc. is believed to be developing mini and mainframe EDI software to complement its micro offerings. Its installed base of micro software presents an opportunity to migrate its users to larger processor software.

3. METRO MARK INTEGRATED SYSTEMS

- The company's EDI software operates on IBM minis, XTs, ATs, and MS-DOS-compatible micros. The software series is called Translator*.

- Translator* supports all TDCC and ANSI X.12 standards and derivatives. Communications facilities are integrated into the mini software but are optional for micro software.

- Internal management report facilities are integrated.

- An exclusive sales and marketing agreement with McDonnell Douglas has ended and the company now directly markets its products to various industries.

  - The cancellation of the agreement was reportedly due to differences of opinion on how the software should be marketed.

  - VANs typically place more importance on generating network traffic than software sales or translation services.

- Metro Mark is soliciting endorsements from industry associations in the grocery and warehousing industries.

4. PROGRAM SCIENCE INCORPORATED

- PSI (Ridgefield, CT) is a computer consulting firm which traces its EDI involvement to a maintenance agreement for the ESCORT system managed by Control Data Corporation for the electronics industry.

- The relationship has continued. The company developed CDC's Redinet and provides technical support to Redinet customers. However, PSI maintains its software rights.

- PSI offers X-Change microcomputer software for IBM PCs and compatibles.
  - X-Change handles purchase orders, acknowledgements, and invoices.
  - It is menu driven and incorporates help screens.
  - It translates documents between standard forms and X.12 standards.
  - It supports asynchronous communications and will support bisynchronous communications with the addition of optional file import and export facilities.
- The company will package its software and a micro for under $10,000. It believes companies should initiate EDI with micros before installing mini or mainframe systems to interface with other applications--a time consuming and often difficult process.
- The company also developed and markets a computer assisted instruction (CAI) course called Redi-Set-Go! which covers the reasons for EDI, ANSI X.12 standards, and communications. The package includes starter programs for sending and receiving data.
  - Two of the modules are suitable for executive overview presentations on EDI.
  - The course can be used by information systems personnel as a guide to developing in-house EDI software.
- X-Change and the CAI products have been endorsed by the American Supply and Machinery Manufacturers Association and the National and Southern Industrial Distribution Associations.

- X-Change marketing was started in September 1985, but company officials project substantial growth as it pursues multiple site sales. PSI is also negotiating for Canadian distribution.

5. TDCC

- The Transportation Data Coordinating Committee supplies EDI software in source code form but does not wish to be considered a software vendor.

  - The TDCC software was developed when no other EDI programs were available.

  - The source code can serve vendors as a base from which to build object code.

  - The TDCC's motivation in making available this software is to propagate the market.

- The software is written in Cobol for IBM mainframes, minis, and PCs and PC/XTs. There is a Fortran version for the Victor microcomputers, with conversions available for HP 3000 and Basic Four minis.

- The software consists of a set generator and editor for transmission and a set interpreter and editor for receiving EDI messages.

  - It supports over 120 transaction sets formatted to TDCC standards.

  - It is table driven and allows the user to redefine internal formats.

  - Editing functions check for field lengths, code validity, and relationships, and check mandatory segment elements as well as sequence.

- Users need to write controls and interface programs to complete table mapping. The internal file format will be generated by the software if the user has a batch order entry system. On-line order entry systems require editing for product numbers, validation and product availability, and other options such as cross-reference files.

- Users can attend TDCC-sponsored classes to assist the customization and installation processes.

- In addition to these software vendors, McDonnell Douglas, TranSettlements, and GEISCO market their own and licensed EDI software.

E. MARKET OBSERVATIONS

1. EDI CREATES OPPORTUNITIES

- Growing use of EDI will lead to increased opportunities for professional services firms as well as hardware, software, and communications vendors.

- Smaller companies need to be included in EDI services as they often create more expense for suppliers order processing in relation to order size than do larger companies.

- More micros will be needed by smaller companies to take advantage of EDI services and to meet the requirements some companies are establishing that their suppliers have EDI capabilities. The growth of micros for EDI imply increasing needs for micro-EDI software.

- Front-end processors or enhancements to current processors may be needed to handle communications and heavier processing loads.

- Software is needed for proprietary EDI networks and by VANs and RCS which may add EDI to their services in the future.

- Professional services will be required by many users to customize EDI software and to provide system integration skills. The task of converting batch systems to on-line will often require external assistance due to the applications backlog at many user locations.

- Several industry associations have issued RFPs on behalf of their members, using professional services firms to evaluate responses and manage implementation.

2. EDI IS CURRENTLY IN PILOTING STAGE

- The current status of EDI can best be generalized as in the piloting or testing phase. Several individual companies and market segments have gone beyond this stage, but most participants have only implemented a limited number of transaction types.

- Based on this observation, INPUT believes that growth will be substantial over the forecast period, with full implementation by the majority of companies in industries now active occurring in the 1990-1995 timeframe.

- The factors influencing the adoption and retardation of EDI are shown in Exhibit V-2.

F. MARKET SHARE: VANs AND RCS

- INPUT's estimates of the EDI market shares held by the principal network services and processing services vendors are shown in Exhibit V-3, based on the estimated number of customers.

EXHIBIT V-2

FACTORS IMPACTING EDI

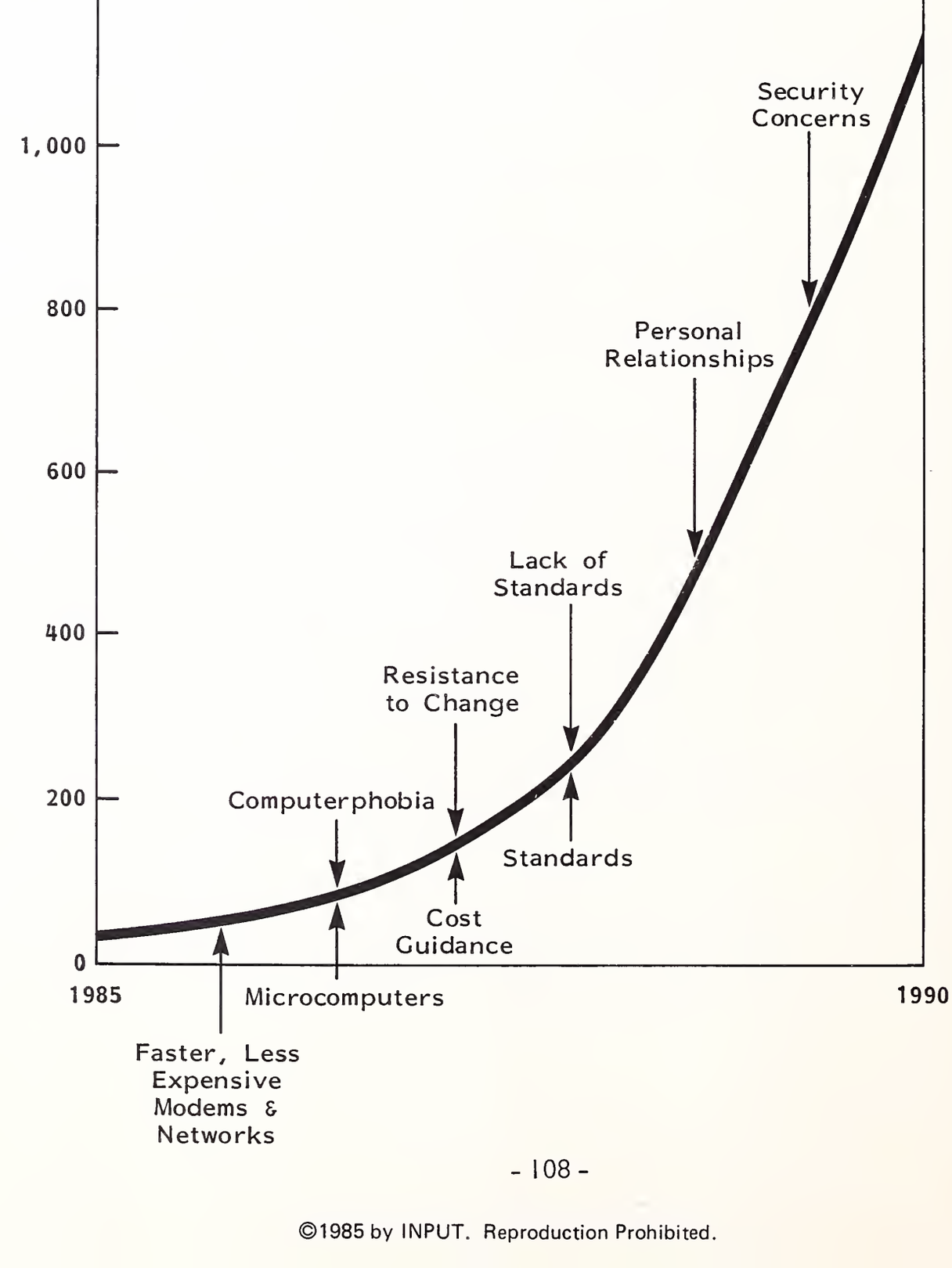
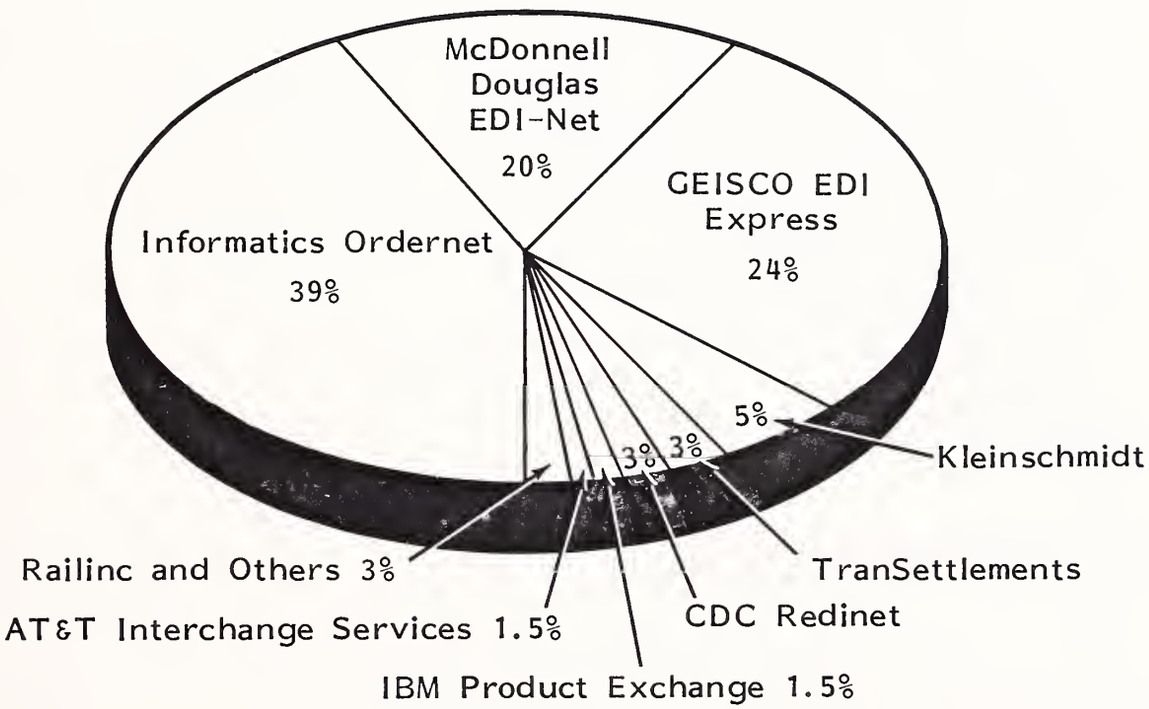


EXHIBIT V-3

CURRENT EDI MARKET SHARES BY NUMBER OF USERS



- Several of these firms have offered services for nearly ten years, and therefore have a time advantage in attaining their reported shares.

G. MARKET SHARE: SOFTWARE

- The micro subsegment is currently dominated by EDI, Inc. Metro Mark Integrated Systems is the only identified mini EDI software vendor. TDCC software and user-developed mainframe applications (often based on TDCC's source code) represent the mainframe subsegment.

- Exhibit V-4 shows these independent companies, identifies the type of software they offer, and provides INPUT's estimate of the number of installations using their software. As noted, the market is embryonic and the number of software installations is small.

- INPUT estimates a growth rate of between 500-800% in EDI software over the next five years.

H. MARKET FORECASTS

1. OVERALL GROWTH

- Electronic methods will account for a substantial portion of large corporation business transactions by the end of the forecast period.

- For the first time since 1969, when EDI was first proposed, there is now a confluence of factors which indicate EDI growth will be exponential. These factors include the proliferation of computer systems, low cost networking options, and growing recognition of the benefits of EDI.

EXHIBIT V-4

INDEPENDENT EDI SOFTWARE VENDORS

VENDOR	MICRO	MINI	MAINFRAME	ESTIMATED INSTALLATIONS	COMMENTS
APL ACDI	X			10	Front Ends Mainframe. Modular.
EDI, Inc. Telink	X			100	Developed TDCC Software. Believed Preparing Main- frame, Mini Products.
Metro Mark Translator*	X	X		25	Lapsed Marketing Agreement with McDonnell Douglas.
PSI X-Change	X			12	Instruction Package Available.
TDCC Set Generator Set Interpreter	X	X	X	125	Source Code Provided.

2. AGGREGATE MARKET GROWTH

- The EDI market is divided among network services, processing services, software, and professional services.

- Aggregated market growth projections are shown in Exhibit V-5, representing a 98% compound annual growth rate (CAGR) through 1990.

3. INDUSTRY SEGMENT GROWTH RATES

- Exhibit V-6 shows INPUT's market estimates related to industry segments. The 1990 forecast is based on analysis of those industries now participating in EDI, an evaluation of which segments will use EDI, and an estimation of proportion of use by the end of the forecast period.

- The principal users will be discrete manufacturing, transportation, and retail distribution.

4. TRANSACTION GROWTH AND THE "CASCADE EFFECT"

- It is estimated that approximately 25 billion business documents are sent through the U.S. mails annually. This represents the potential number of transactions for EDI; however, only a portion will ever be handled electronically.

- Network planners should be aware of a possible "cascade effect" leading to exponential EDI transaction growth within a relatively short period of time.

- Currently, EDI system users are piloting a few transaction sets. When extended, each exchange could require as many as 12 and potentially more electronic transactions, such as:

EXHIBIT V-5

EDI MARKET GROWTH
1985-1990

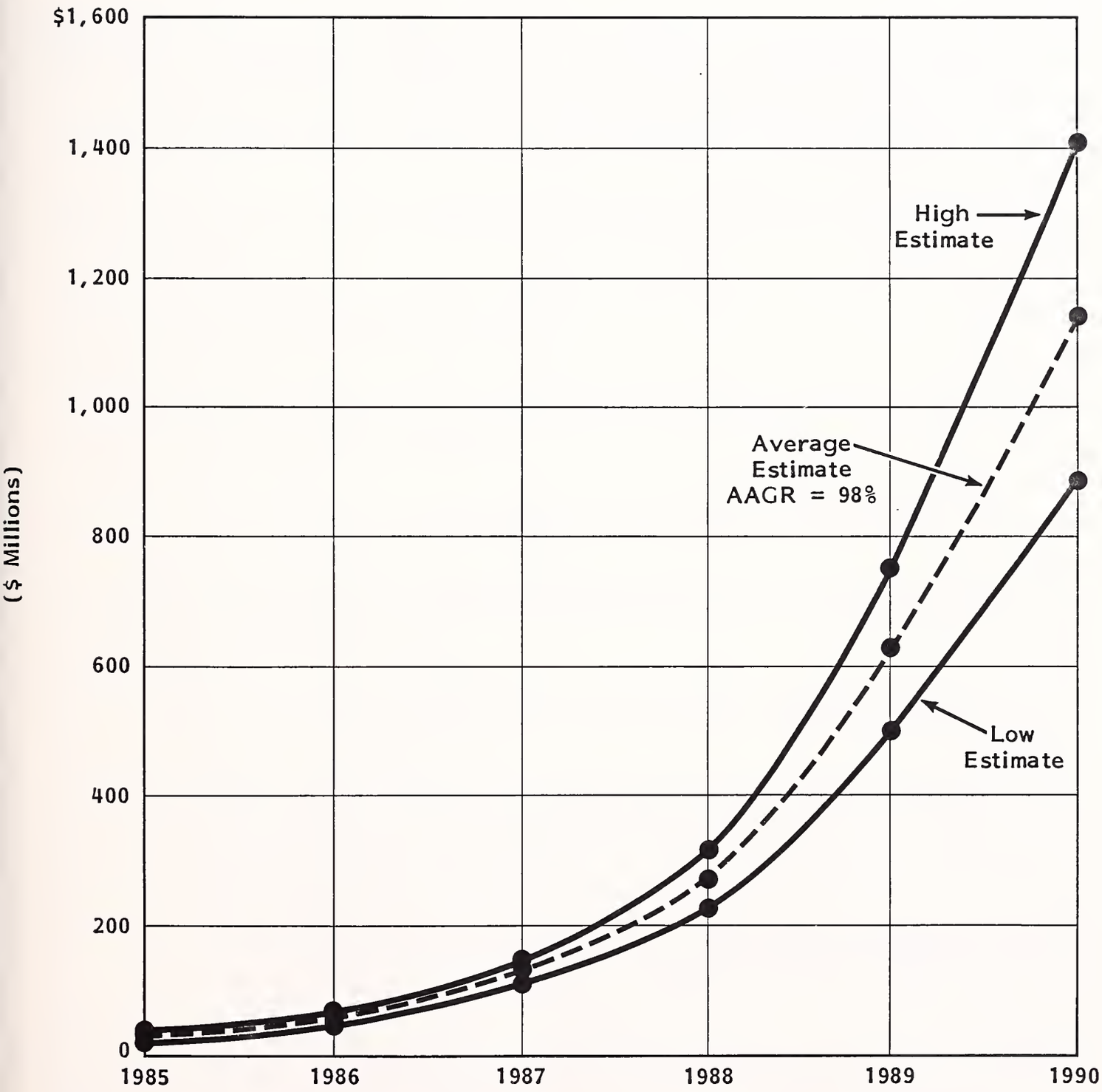


EXHIBIT V-6

EDI MARKET FORECAST INDUSTRY SEGMENTS
1985-1990

INDUSTRY SEGMENT	1985 (Percent)	1985 VALUE FROM MEAN ($ Millions)	1990 (Percent)	1990 VALUE FROM MEAN ($ Millions)
Discrete Manufacturing	21%	$7.98	17%	$195.33
Transportation	42	15.96	18	206.82
Medical	4	1.52	10	114.90
Banking	1	0.38	10	114.90
Insurance	1	0.38	6	68.94
Services	0	0.00	2	22.98
Retail Distribution	11	4.18	19	218.31
Process Manufacturing	8	3.04	4	45.96
Federal Government	.5	0.19	4	45.96
State/Local Government	0.0	0.00	3	34.47
Cross Industry: Education and Training	0.0	0.00	1	2.72
Other	11.5	4.37	7	77.71
Total Market Size		$38.00		$1,149.00

- A request for information requires a response.

- A request for bid leads to a bid, acknowledgement of the bid, and an award.

- A purchase order leads to a confirmation which in turn leads to a shipping notice and an invoice.

- If the cascade effect occurs, it could lead to network congestion and reduced response times. Accordingly, network planners need to review current capacity and project needs based on the intentions of large network users.

- Exhibit V-7 is INPUT's estimate of transaction volume growth between 1985 and 1990.

5. VANs HAVE THE MOST TO GAIN

- INPUT believes that VANs are best positioned to benefit from the growth of EDI due to the following factors:

  - VANs are virtually omnipresent, cost-effective communications links.

  - VANs and their processing affiliates serve many of the industries now implementing EDI.

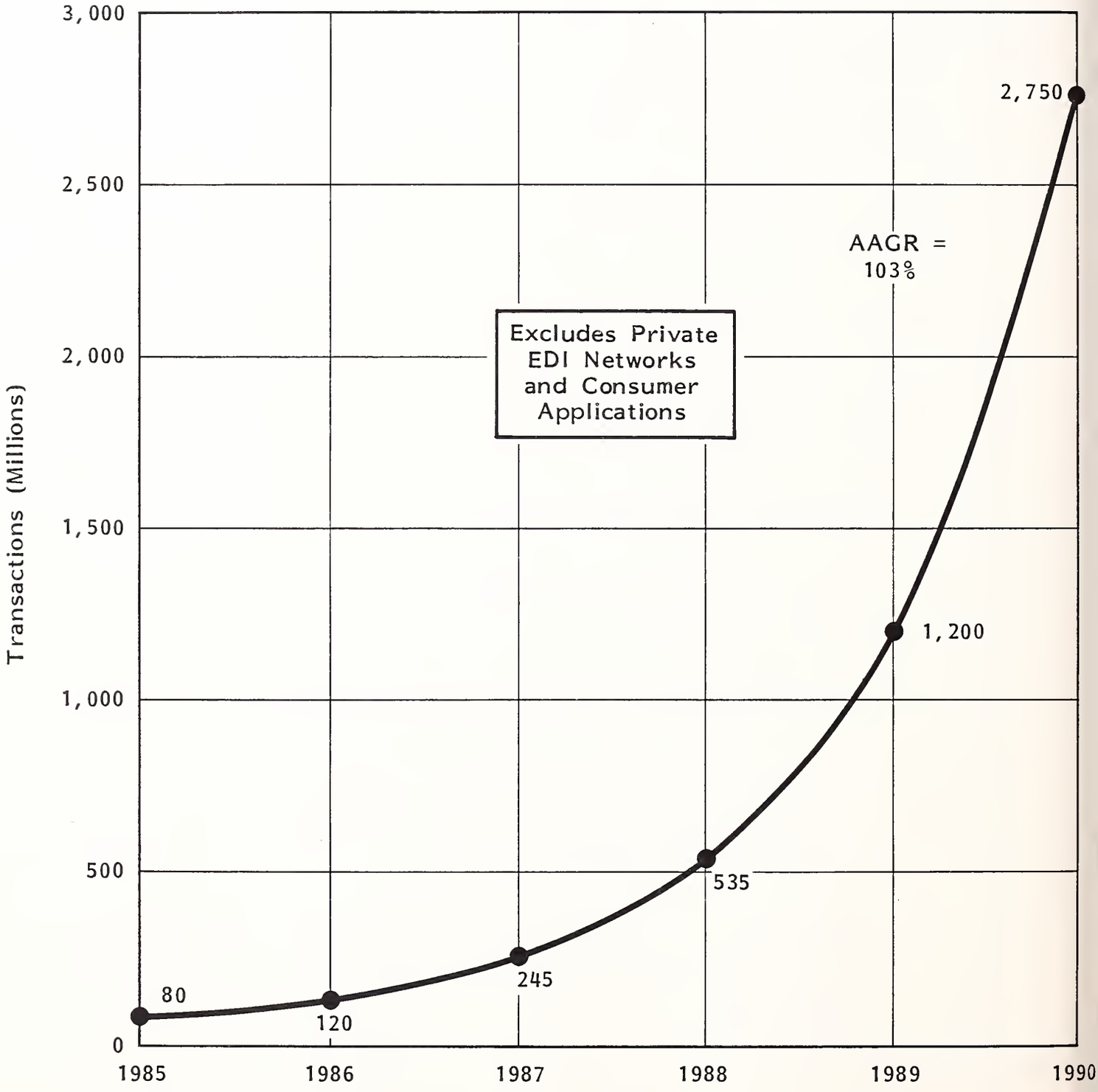
  - VANs generally have mature, widely dispersed marketing organizations.

  - VANs offer international capabilities through their own overseas presence or through arrangements with foreign networks and International Record Carriers (IRCs).

  - Several VANs currently offer EDI services which have been endorsed by industry associations, and they will capitalize on their product development leads.

EXHIBIT V-7

EDI TRANSACTION GROWTH
1985-1990



- VANs will experience significant EDI growth through 1990 and beyond; however, INPUT believes growth will be relatively slow and methodical through 1986, with VAN/EDI profitability reached in the 1987-1988 timeframe as transaction volume grows.

- It is expected that per-transaction fees will decrease as volume increases, development costs are recovered, and the effects of competition work to lower prices.

- It is also assumed that translation processing revenues will decrease, while mailbox and other EDI processing revenue will continue to grow. This will be due to users installing EDI translation software on their own processors. Also, as standards are accepted, there will be less need for translation processing.

6. SMALL RCS WILL HOLD NICHES

- Small remote computing services will continue to hold niche positions in industries currently served, such as rails and trucking, but will feel pressure from larger services, VANs, and private systems. Acquisitions are possible.

- Small RCS vendors will experience slower growth than other market segments despite the growing acceptance of EDI because of market needs for network services.

- INPUT's overall RCS forecast projects industry revenues reaching $19.2 billion in 1988, but this includes the processing services provided by VAN affiliates.

7. SOFTWARE VENDORS HAVE TWO OPTIONS

- Software vendors will benefit from EDI growth because of the increasing computerization of businesses which will minimally use microcomputers for routine business activities as well as EDI applications.

- Software vendors and professional services firms will also find opportunities with industry groups categorized by a limited number of trading partners for implementing private EDI systems.

- EDI software will be adopted by large and small companies with a preponderance of micro packages being purchased as standalone systems or to front-end larger processors. The costs of micro software will continue to be lower than mini and mainframe software, but the volume of sales will lead to greater revenue for this segment.

- The next chapter discusses EDI trends and opportunities, and presents INPUT's recommendations to market participants.

VI MAJOR TRENDS AND OPPORTUNITIES, AND RECOMMENDATIONS

VI MAJOR TRENDS, OPPORTUNITIES, AND RECOMMENDATIONS

A. INTERNATIONAL EDI

1. USER NEEDS/MARKET REQUIREMENTS

- Few companies interviewed by INPUT require international EDI applications. However, as domestic companies rely on more offshore sourcing of components, the need to conduct international business electronically grows in importance.

  - International trade documents are more complex than those required domestically.

  - Documentation errors can cause expensive delays in shipment, compounded by the distances involved, language barriers, government regulations, and other factors.

  - The costs of international documentation is estimated at $8 billion annually.

- The National Committee on International Trade Documentation (NCITD) is a membership organization dedicated to simplifying international trade paperwork by 50%, in part through the use of electronic communications.

- Cargo Data Information System (CARDIS) is designed by the NCITD to meet the information needs of customs, carriers, brokers, draymen, forwarders, and other parties involved in international cargo handling within a shipping facility or port.

- CARDIS is supported by the U.S. Department of Transportation.

2. REGULATORY ISSUES

- There are regulatory problems associated with transnational data flows:

  - Many countries have laws regulating international information exchange, initially designed to protect individual privacy. Some countries are now using regulations to insure a share of information processing markets.

  - Even data transfers between branches of a company can be restricted.

  - The laws of various nations are not uniform and there is no central U.S. agency concerned with the issue.

  - Regulations are evolving based on voluntary guidelines followed by information services vendors.

  - International EDI through third parties reduces an individual company's concerns because the vendor handles the issue.

3. U.S. INFORMATION SERVICES COMPANIES INVOLVED IN INTERNATIONAL EDI

- GEISCO is actively pursuing international EDI applications and offers the GTDI standards for such applications.

- The Trade Express System offers mailboxing and transmission of trade documents.

- It integrates electronic mail, a bulletin board for sharing information, computer conferencing, and trade data base inquiry and retrieval capabilities.

- GEISCO is also negotiating with major international banks for EDI participation.

- Other VANs also have international capabilities with local access supplemented by other public data networks and connections to International Record Carriers.

- A well positioned VAN for competitive international services is Computer Sciences Corporation's Infonet, with multinational business relationships, local access in 19 countries, IRC links to 90 countries, and gateways to 11 in-country data networks. It has its own representatives in 24 countries.

  - However, with the exception of its DARTs service for internal use by the distribution industry, Infonet currently offers no EDI-like services.

  - Infonet might be considered by users needing international EDI services and by vendors who can offer services through the network.

- International Record Carriers are potential participants or partners in international EDI.

  - IRCs often connect to existing VANs, and all IRCs now interconnect with each other.

  - They are now permitted to offer services both domestically and internationally. Some of the IRCs have expanded their offerings to

include voice communications, packet switching technology, and private network services.

- IRCs are no longer competing on price alone but are adding services to meet changing customer needs.

- INPUT believes that IRC resources should not be overlooked as tools for possible strategic alliances or as potential competitors in the international EDI marketplace.

4. INTERNATIONAL EDI GROWTH

- The international trade use of EDI is currently embryonic.

  - Growth in this area will follow domestic usage.

  - Regulatory restrictions will be eased particularly through EDI service vendor negotiations with national regulatory agencies.

  - The market is estimated to approach $1 billion within five to seven years by replacing current paper-based document flows with EDI services.

5. EDI IN OTHER COUNTRIES

- It is beyond the scope of this report to fully report on the EDI activities in countries other than the U.S. This section briefly summarizes some applications.

  a. Europe

- GEISCO Ltd. (U.K.), working with the Society of Motor Manufacturers and Traders (SMMT), a British trade association, and with the Organization for

Data Exchange by Teletransmission in Europe (ODETTE), supports MotorNet EDI services.

- Nine European automakers are the founders of ODETTE.

- Using U.N. Economic Commission for Europe approved standards as a base, ODETTE is developing communications standards and a data dictionary for manufacturers, suppliers, customs authorities, and shippers throughout Europe.

- The European chemical, electronics, shipbuilding, and steel industries will soon follow, according to observers.

- Istel, one of the largest European systems houses, is offering EDICT, a new general purpose EDI service supporting various standards.

- The Article Numbering Association (UK) Ltd., the British equivalent of the U.S. Uniform Product Council, signed an agreement with ICL, a mainframe computer company, to supply a communications network by TRADANET.

  - ICL is also working in a joint venture with Barclays Bank, called BARIC, for EDI financial services.

  - A network of VANs are supported through three sites. The VANs will eventually be transferred to the new TRADANET network.

  - TRADANET was launched in May 1985 after nine months of testing.

  - It is based on Tradacoms (Trading Data Communications) standards and is designed for retailer/supplier communications.

  - The Tradacoms standards have been endorsed by the Customs and Excise tax agency in England.

- It is estimated that by the end of 1986, the system will be carrying two billion characters of data weekly.

b. Canada

- The Canadian approach to EDI is unique.

- The EDI Council of Canada was formed in December 1984. Its members evaluated various EDI options and have learned from U.S. EDI experiences.

  - The council has adopted a policy of insisting each participant use a third-party vendor rather than implement private EDI systems.

  - Third-party mailboxes are both store and retrieve and store and forward and, therefore, appear as point-to-point communications to U.S. trading partners.

  - U.S. standards are viewed as message types, and the Canadian standard is called EDI, which uses the same message types as U.S. industries.

  - X.400 communications protocols (the international electronic mail standard) are used to connect mailboxes, supporting various communications speeds and protocols.

  - This approach has the effect of leading to faster development of Canadian EDI than otherwise would have been realized.

- Third-party networks and services involved are GEISCO, Telecom Canada, CrownTek (a data processing bureau), and SCM Kleinschmidt.

- Dyad, a Toronto software house, is doing a feasibility study regarding EDI in Canada, and Cynerlogic (Calgary) is studying EDI applications for Canadian government agencies.

- The EDI Council of Canada participates in U.S. standards maintenance committees.

- It has over 100 member companies, including Canada's largest firms in mass merchandising (Hudson's Bay and Sears), as well as representatives in the drug, food, warehousing, and electrical industries. Council officials claim two to three new members are being added daily.

B. THE EDI CLEARINGHOUSE CONCEPT

- Companies tend to use one VAN or RCS predominantly, hampering cross-industry EDI transfers.

  - Communications are generally limited to companies on the same service.

  - An alternative is to have multiple arrangements, but this requires maintaining several equipment and software settings to accommodate communications on different networks.

  - Depending on volume, it may also require multiple dedicated lines.

- Some VANs do have gateways to international packet networks (using X.75 standards) or IRC networks. IBM's Information Network provides for access to Telenet for "off-net" locations. However, there are few examples of domestic internetworking exchanges.

- The absence of such connections creates a need for services supporting inter-network EDI transfers and also for RCS exchanges.

1. CONTROL DATA NETWORK TRANSFER SERVICE

- Control Data's EDI clearinghouse service allows users to access trading partners on other networks and services.

  - The Network Transfer Service connects customers communicating at 2,400 to 9,600 bps.

  - NTS is offered to competing EDI networks and RCS vendors.

  - There are currently few users. TranSettlements is one, as is CDC's own Redinet (jointly marketed with AT&T's Accunet Packet service). GEISCO is believed to be discussing a possible relationship.

  - Rates are typically $0.10 above normal network transaction changes.

2. AT&T

- AT&T's Interchange Services are designed to connect corporate private networks and can serve as a network clearinghouse assuming necessary conversions are provided or handled by users.

3. GLOBENET

- A new network services participant, Globenet (Chicago, IL) intends to provide for interchange between value added (packet) networks, handling protocol and communications conversions.

- While EDI is not the intention, it can be the net result of the service provided. A subscriber to one VAN can communicate with a trading partner on another VAN using VAN-provided EDI services.

- This approach reduces networks to a common denominator and facilitates communications across industry groups.

4. ANALYSIS

- The success of EDI internetwork clearinghouse services is in question.
  - Existing VANs are reluctant to funnel traffic to a rival, especially through a third party which will exact its transfer fee, adding to transaction costs.
  - However, since VANs act as common carriers, they accommodate all potential customers.
  - RCS and proprietary network operators may be more likely candidates for clearinghouse services which complement but do not compete with their activities.
- Some EDI users interviewed feel that internetwork exchanges will be required if VANs hope to provide full, "universal" service to customers; otherwise, other methods such as private EDI networks will be used.
- VANs are more likely to enter internetwork exchange agreements between themselves, perhaps as a prelude to network mergers.
- McDonnell Douglas EDI-Net personnel have suggested they are planning EDI clearinghouse services themselves.
- There is inherently little reason why data communications should not eventually become as universal as the public switched telephone network (PSTN).
  - One party should be able to reach another regardless of different transmisison vendors being used.

- The public telephone network is an appropriate analogy--a General Telephone customer can call a Pacific Bell customer, for example.

- INPUT believes the philosophy that universal telephone service will eventually apply to value added networks and more broadly to electronic mail and data communications as a whole.

  - This is the intent of the developing Integrated Services Digital Network (ISDN) and X.400 standards in E-mail.

  - X.400 standards are now being adopted.

  - While ISDN is being demonstrated, full implementation will probably not occur until the late 1990s or later.

C. ENHANCEMENTS HELP THIRD-PARTY SERVICES

- Adding value to third-party services will provide advantages to vendors as private EDI systems generally provide only transaction services. Value added enhancements may include:

  - The provision of sales forecasts and market analysis based on information transmitted through the EDI service.

  - Links between EDI systems and industry-specific data bases. Many VANs already provide data base gateways. New data bases may evolve using industry-specific transaction statistics.

  - Automated order entry linked to in-house inventory systems. When critical supplies reach threshold levels, replacement stock is ordered.

- Graphics, in a marriage of videotex or computer assisted design and manufacturing (CAD/CAM) and EDI, will support design, specification, and blueprint exchanges between trading partners.

- On-line EDI ordering systems may be aggregated into comparison shopping services. Many products will become commodities. Working against this however are geographical trading areas which affect transportation costs.

- These value added enhancements will provide advantages to third-party EDI vendors over private EDI systems and may be necessary to insure the development of the critical mass of transaction traffic necessary for profitable operations.

- Exhibit VI-1 summarizes these value added EDI services and industry trends.

D. OPPORTUNITIES

- Opportunities for EDI vendors exist in providing services and products to companies within industries now implementing EDI which have yet to join their trading partners. These second and third tier companies will need professional services, software, network access equipment, and turnkey systems if they currently lack computers.

- There are opportunities for international applications as described in Section A of this chapter, and for services through Japanese VANs now being established by various vendors and partnerships.

- Longer term opportunities may exist for VANs to move private network users to VAN EDI services by demonstrating the benefits of expanding network reach and the economies of third-party network management.

EXHIBIT VI-1

ADDING VALUE TO THIRD-PARTY EDI SERVICES

- Forecasts and Market Analysis
- Data Bases
- Integration with Internal Applications
- Graphics
- Comparision Shopping

- Opportunities remain to be developed in industries where there is little current EDI activity. Examples include:

  - Building and construction materials, including floor coverings, glass, plumbing supplies, ceramics, and mortar.

  - Footware, textiles, and leathers.

  - Specialty retailers and their distributors and suppliers such as books and records, jewelry, gems, collectibles, gifts, greeting cards, sporting goods, or after-sale automotive equipment.

  - Film and photo supplies.

  - Petroleum products.

- While products are most suited to EDI applications, opportunities remain to be explored in service industries. One example is broadcast advertising.

  - The industry is characterized by national, regional, and local advertising representatives, cooperative advertising plans (which share costs between manufacturers and retailers), and local station sales efforts.

  - "Avails" or open time for advertising could be sold on an EDI system. Station demographic information could be available on a related on-line data base.

  - Advertising time could be purchased electronically by interested advertisers, and copy could be distributed the same way, on short notice, to take advantage of last minute openings, perhaps at a discount.

- While there are EDI-like services for health insurance processing, there may be opportunities for coordinated benefits processing.

  - In two income families, health care benefits often need to be coordinated between suppliers. The U.S. Department of Labor estimates there are 22.4 million dual worker families, with growth continuing.

  - The documents of insurance carriers may be in different formats, requiring EDI conversions.

  - GEISCO and IVANS (on IBM's Information Network) may be the most experienced vendors for developing products in this area as they have current services. GEISCO is facilitating industry discussions to solve this problem.

  - Industry interest is reportedly high in developing such services.

- Vendors with expertise in specific industries should explore how EDI may fit current business practices in those industries and pursue promising areas.

- These opportunities are shown in Exhibit VI-2.

E. RECOMMENDATIONS

- This section provides INPUT's recommendations to EDI market participants. While segmented for the primary participants (VANs, RCS, software vendors, and proprietary network developers), the recommendations to one segment may well apply to the others.

EXHIBIT VI-2

EDI OPPORTUNITIES

- International Trading and VANS (e.g., Japan)
- Undeveloped Industries
  - Building Materials
  - Textiles
  - Speciality Retailers
  - Photo Supplies
  - Petroleum
  - Services (Advertising, Benefits Coordinations)

I. CENTRAL RECOMMENDATION: CREATE AWARENESS

- INPUT's central recommendation is linked to the finding of only moderate awareness of EDI by IS professionals.

  - INPUT's surveys found IS managers rated their personal knowledge of EDI at 2.8, with 5 indicating high awareness.

  - A literature search of general and business publications found under 20 articles about EDI, with most published in special interest industry magazines such as the purchasing, distribution, grocery, and transportation industries.

- This indicates a need for better vendor promotion of EDI as a strategically important tool, applicable to a range of industries, for improving company operations while reducing costs.

- Vendors should direct more attention to EDI in their marketing, providing informational programs through industry associations, placing articles in general information services publications, and orienting advertising toward the EDI solution.

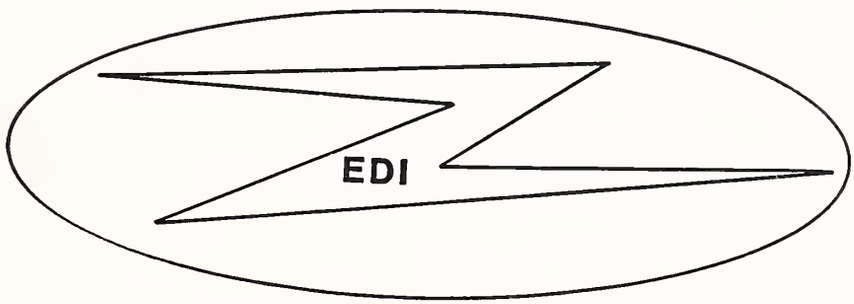
- Industry groups should consider adopting an EDI graphic symbol for cross-industry usage to identify companies which use EDI standards. Promotional use of such a symbol on letterhead in advertising and marketing literature will provide competitive advantages by enhancing corporate imagery while creating more EDI awareness.

- These recommendations are shown in Exhibit VI-3.

EXHIBIT VI-3

CENTRAL RECOMMENDATION

- Create Awareness!
  - Articles
  - Seminars
  - Advertising
  - An EDI Graphic Symbol



2. RECOMMENDATIONS TO VALUE ADDED NETWORKS

- Consider establishing a separate division or department to aggregate currently distributed strengths and focus the EDI sales and service effort.

- Focus on markets in which you have expertise or hire and train marketing and sales personnel from industries being targeted for EDI services.

  - Exercise caution in this later approach, particularly if EDI services are a new offering.

  - It is difficult enough to develop new services without the burden of learning a new market.

  - A long-term option may be to develop specific-industry EDI services for later sale to another vendor with industry-compatible offerings.

- Target marketing efforts to end-user department managers rather than information service managers, demonstrating EDI benefits to purchasing, business office, and other appropriate department heads. However, be sure to involve IS in the decision loop to prevent hostility from those who might feel excluded from decision-making.

- Position E-mail and scripted/prompted services for smaller, low volume users in an EDI simulation.

  - This will help to capture and eventually migrate users to EDI as volume becomes greater.

  - System accounting should be used to flag high volume E-mail users to assist marketing departments in identifying specific customers requiring an EDI solution.

- Standardize on X.12 and support both X.PC and MNP error correcting protocols for dial-up communications between micro users and network nodes.

- Consider unconventional pricing schemes such as flat rates tied to transaction volume levels instead of measured connect time or character transmissions.

- If not already offered, implement EDI services as a strategy to prevent "churn," the turnover of current customers signing with competitive VANs who offer such services. As noted in this report, subscribers have low intrinsic loyalty to VAN vendors.

  - If EDI services are currently provided, develop strategies to maintain the current customer base through:

    . Training.

    . Newsletters.

    . VAN-sponsored industry seminars addressing common issues.

    . Sponsored user groups.

    . Adoption of consumer marketing tools such as bonus plans and premiums to encourage volume usage levels.

- Consider the feasibility of providing inter-VAN gateways on existing networks or by participating with third-party vendors to facilitate EDI user communications.

  - This strategy will allow participation in the revenue-generating possibilities of such communications.

- Use these relationships as strategic partnering toward possible network mergers.

- As part of inter-VAN services, consider the feasibility of developing a "buyer's service" for large corporate and governmental procurement departments where users can comparison shop, issue requests for bid, and evaluate supplier proposals.

- Provide gateways to industry-specific data bases as a value-added service. Examples include market information or tariff/shipping services.

- Plan for network growth due to increased EDI usage.

- INPUT's recommendations to VANs are summarized in Exhibit VI-4.

3. RECOMMENDATIONS TO SMALL REMOTE COMPUTING SERVICES

- Evaluate the need for, and interest in, EDI by the industries now using your services. A strong customer knowledge base can be invaluable and is best acquired by focusing resources on a small number of market segments.

- License EDI software from others if current resources prohibit cost-effective internal development. Opportunities may be lost if in-house development slows entry into a rapidly developing market.

- Provide or arrange for customization services to adapt order entry and inventory systems to accept batch entry (required for full EDI implementation) and to handle translations from company-specific data formats to industry standard formats.

- Establish or strengthen local sales and support offices to improve customer response time.

EXHIBIT VI-4

VAN RECOMMENDATIONS

- Aggregate Corporate Strengths
- Focus on Markets
- Use E-Mail as "Poor Man's EDI"
- Standardize on X.12
- Consider Unconventional Pricing
- Use EDI to Combat "Churning"
- Consider Inter-VAN Gateways
- Provide Data Base Access

- Investigate expansion of marketing and distribution channels through options such as joint ventures with manufacturers. Partnering will enable quick and economical development and marketing of services to reach potential customers.

- Cultivate consultants who are becoming more important as IS markets and technologies grow in complexity.

- If not already utilized, evaluate the advantages of VAN networks as an alternative to 800-number inbound lines and WATS outcall services to reduce network management costs.

- Investigate the feasibility of selling micro-based turnkey systems and support for smaller, uncomputerized trading partners in specific industries. Realistically evaluate your ability to provide service and support.

- Offer analytical as well as transaction applications for management analysis and report generation, and capitalize on industry needs to access large-scale data bases for market analysis. These data bases can be generated from transactions or accessed through gateways.

- INPUT's recommendations to small RCS vendors are shown in Exhibit VI-5.

4. RECOMMENDATIONS TO SOFTWARE VENDORS

- It is especially critical to develop easily used, inexpensive micro software for new EDI users. The growing acceptance of microcomputers is a key factor driving the growth of EDI service.

- Develop alliances with hardware vendors and value added dealers and resellers (VADs and VARs) to develop micro-based turnkey EDI systems, particularly for smaller, possibly uncomputerized users. Turnkey systems should include EDI facilities with other industry-specific applications.

EXHIBIT VI-5

RCS RECOMMENDATIONS

- Use Customer Knowledge to Advantage
- License Software
- Provide Professional Services
- Strengthen Sales and Support
- Investigate Joint Ventures
- Cultivate Consultants
- Evaluate Turnkey Sales
- Offer Integrated Applications and Data Base Access

- Investigate marketing of these systems through RCS and VANs, but recognize that VANs are focused on generating network volume and may not provide a great deal of marketing support.

- A better form of strategic partnering may be to establish alliances with larger software companies and professional services firms which have marketing and support organizations as well as customer lists which would not otherwise be available. Such alliances may lead to more permanent bondings, such as mergers, at a later date.

- Fully research the unique needs of industries which have yet to implement EDI, and thus remain opportunities.

  - While many industries are at least in the planning stages, many others have yet to explore EDI.

  - It is difficult to identify industries which could not benefit from EDI.

  - Those most suitable are characterized by supplier/broker/buyer relationships, a high volume of transactions, and generally material products (as opposed to intangible services) which are not manufactured to unique, one-of-a-kind specifications.

- Work with industry associations to develop products meeting needs and seek endorsements from those associations.

- Seek to develop business with networks not currently offering EDI services. Examples include smaller VANs, International Record Carriers (IRCs), and the Bell Operating Companies (BOCs) who, with FCC approval, will be offering intra-LATA packet switching services.

- For software vendors providing services to industries where EDI is being adopted under industry association sponsorship, target software and professional service efforts to enhance current products (i.e., material resource planning, order processing, decision support, and management report generators) allowing links to EDI services.

- Provide integrated communications facilities in EDI software for links to industry-specific third-party data bases and plan for future electronic funds transfer components.

- INPUT's recommendations to software vendors are shown in Exhibit VI-6.

5. RECOMMENDATIONS TO PROPRIETARY EDI SYSTEMS DEVELOPERS

- It is advantageous for large companies to develop proprietary, on-line systems supporting business transactions.

  - Such systems work to maintain the customer base and provide a competitive edge.

  - There is a lower chance of security breaches. A company-controlled system is more confidential than one operated by a third party.

  - Such systems will shift some of the internal customer service burden to customers.

  - The resulting savings will defer development costs and help maintain competitive prices on goods and services.

- However, unless developed with attention to future needs, proprietary networks may later prove burdensome to enhance.

EXHIBIT VI-6

SOFTWARE RECOMMENDATIONS

- Develop Micro Software
- Form Alliances:
  - VARS, VADS
  - Larger Companies
  - Small VANs, IRCs, BOCs
- Seek Industry Endorsements
- Enhance Existing Applications with EDI

- Often the pressures to meet internal needs prevent attention to standards which add another level of complexity to system implementation.

- INPUT recommends that proprietary EDI systems use X.12 standards and that users/developers monitor refinements to these standards to maintain compatibility for future needs.

- Most inter-company communications are not confined to a specific industry.

- Keeping options open for extension to other industry groups offers the safeguard of system flexibility should future requirements mandate.

- Developers should solicit feedback from system users, implementing changes recommended. Otherwise, an inflexible system will create frustration and will not be used.

- Consider the advantages of providing your traditional suppliers and customers with micro-based EDI terminals and software on a no-cost or at-cost basis, and the advantages of sharing personnel resources for the development of EDI systems to encourage EDI use and reduce costs.

- Managing a proprietary EDI network requires a commitment in resources for both implementation and management. Carefully evaluate your ability to make that commitment before implementation, and use a third-party service if there is any question about company support.

- Form an EDI task force of company representatives to work across departmental lines and to avoid internal jurisdictional problems.

- An EDI development strategy should be based on upgrading existing management information systems in stages to provide remote on-line ordering, order

inquiries, and electronic messaging by principal customers, later adding functions such as electronic invoicing.

- Guidance in implementation, programming, transaction sets, definitions of data elements, and communications standards is available from TDCC and industry associations.

- Industry-dominant companies should consider requiring their suppliers to use an EDI system as a condition of doing business.

  - Partners not conforming to standards or using manual systems might be levied a surcharge to cover the additional costs involved. While this may not be advisable in some industries such as those dependent on uncomputerized suppliers, with proper marketing the benefits of EDI systems will be recognized.

- These recommendations are summarized in Exhibit VI-7.

- The next chapter summarizes INPUT's findings on EDI and offers final observations about the market and its potential.

EXHIBIT VI-7

PRIVATE NETWORK RECOMMENDATIONS

- Use EDI for a Competitive Advantage
- Plan for Future Needs
- Consider Supplying Terminals to Trading Partners
- Form an EDI Task Force
- Evaluate Ability to Manage the Network
- Upgrade Existing Systems in Stages
- Require Suppliers to Use EDI

VII THE FUTURE OF EDI - CONCLUSIONS

VII THE FUTURE OF EDI - CONCLUSIONS

A. EDI IS NOW BEING PILOTED

- EDI is currently being implemented by first tier companies in a small number of industries for a few types of document exchanges.
  - EDI is in the piloting stage.
  - Needed linkages are missing. When these links are completed, within the next five years, the full potential of EDI will be demonstrated. EDI systems will become fully integrated, involving all participants in commercial trade--manufacturers, brokers, distributors, warehouses, transportation carriers, banks, and the business customer.

B. AWARENESS IS KEY

- The growth of EDI is linked to a number of factors.
  - One of the most important factors is greater awareness.
  - Another factor is the acceptance of standards.

- A third factor is the willingness of larger companies to embrace the technology, thus introducing their smaller trading partners to EDI systems.

- Users are required to adopt new ways of looking at information flows, to recognize the value of information, and to acknowledge the competitive advantages EDI can provide.

- However, private EDI networks will work to retard the market by slowing acceptance of standards, limiting trading relationships, and excluding potential participants.

C. THE POTENTIAL IS GREAT

- EDI shows every indication of being poised for explosive growth. Accordingly, companies with EDI products and services are assuming positions to capitalize on growing demands.

- In this competitive marketplace, poorly planned enterprises will suffer the consequences of their deficient actions, while those with foresight and strategic planning investments will gain substantial benefits.

- INPUT's conclusions on EDI are shown in Exhibit VII-1.

EXHIBIT VII-1

EDI CONCLUSIONS

- EDI is Being Piloted
- Awareness Is Key
- Opportunity Is Great

APPENDIX A: EDI TERMS DEFINED

APPENDIX A: EDI TERMS DEFINED

- ANSI - American National Standards Institute.
- ASC - American Standards Committee.
- BATCH PROCESSING - A data processing/data communications method which groups transactions. Compare to real-time processing.
- CARDIS - Cargo Data Information System, a program of the National Council on International Trade Documentation.
- CIDX - Chemical Industry Data Exchange, based on ASC X.12.
- COMPLIANCE CHECKING - A function which verifies that document information is received in the right order and in the proper format.
- EDI - Electronic Data Interchange. The computer-to-computer communications based on established business document standards or using translations by EDI software housed on users' computers, located at remote computer service bureaus or on value added network processors.
- EDX - Electronics Industry Data Exchange, based on ASC X.12.
- EFT - Electronic Funds Transfer.

- ELECTRONIC MAIL - The transmission of text, data, audio, or image messages between terminals using electronic communications channels.

- ELECTRONIC MAILBOX - A store and forward facility for messages maintained by a transmission or processing facility.

- GTDI - General Trade Data Interchange, an international standard, developed from TDI, accommodating compromises of French participants in SITPRO, the agency behind U.N. certification of the standard.

- ICOPS - The Industry Committee on Office Products Standards, sponsored by two office products trade associations for EDI applications.

- IVANS - Insurance Value Added Network Service, provided on IBM's Information Network.

- JEDI - The Joint Electronic Data Interchange Committee, consisting of representatives of industry trade associations coordinating development of a reference EDI dictionary for the creation of new EDI transactions, segments, or data elements.

- NACHA - National Automated Clearing House Association, a banking services industry group.

- REAL-TIME PROCESSING - A data processing or transmission method with data entered interactively. Response to input is fast enough to affect subsequent input. The results are used to influence a currently occurring process.

- RCS - A Remote Computing Service Bureau facility which arranges to process some or all of a user's workload. Similar to a VAN (see below) but without extensive network services.

- SITPRO - Simplification of Information Trade Procedures, referring to European/international EDI standards approved by the U.N.

- STORE AND FORWARD - The capability of a transmission or processing facility to hold messages or data until requested or until a prescheduled time.

- TDCC - The Transportation Data Coordinating Committee, an early advocate for EDI. Also refers to U.S. EDI standards.

- TDI - Trade Data Interchange, an international shipping standard (also see GTDI).

- TRANSLATION - Transforming information sent in one format to another format.

- UCS - Uniform Communications Standards. The EDI standards used by the grocery industry, based on X.12 and coordinated by the Uniform Product Code Council.

- VAN - Value Added Network. A common carrier network transmission facility, usually augmented with computerized packetizing which may also provide store and forward switching, terminal interfacing, error detection and correction, and host computer interfaces supporting various communications speeds, protocols, and processing requirements.

- WINS - Warehouse Information Network Standards, promoted by two representational associations--the International Association of Refrigerated Warehouses and the American Warehousemen's Association.

- X.12 - A set of generic EDI standards, approved by the American Standards Committee.

APPENDIX B: EDI SERVICES AND SOFTWARE

APPENDIX B: EDI SERVICES AND SOFTWARE

A. VALUE ADDED NETWORK EDI SERVICES

1. CONTROL DATA CORPORATION - REDINET

- Redinet Intercorporate Business Transaction System is a mailbox service which uses AT&T's Accunet network.
- It uses X.12 standards, validates formats, and performs needed translations and conversions.
- Price depends on volume:
  - Up to one million monthly characters are billed at $0.50/thousand.
  - One million to 15 million are billed at $0.25/thousand.
  - Over 15 million are billed at $0.15/thousand.
- Further discounts are provided for overnight transactions. There are no monthly or startup fees.

2. GENERAL ELECTRIC INFORMATION SERVICES - MARKNET

- GEISCO's EDI Express System is operated as part of the Mark III teleprocessing network.
  - It supports X.12, TDCC, international standards, and private formats.
  - Asynchronous access is supported at 300 or 1,200 bps, and bisynchronous at 2,400 or 4,800 bps.
  - There are approximately 750 access points worldwide.
  - EDI Express provides mailbox service or optional out-dialing.
  - Billing can be shared by trading partners.
- Several microcomputer software packages are available:
  - EDI-PC and GE-Link support menu-driven communications and provide form-fill screens.
    - The micro can work in tandem with host computers, with the host passing documents to EDI-PC or GE-Link micro prior to transmission.
    - This permits translation from an internal, private standard to a public standard.
  - Other micro software which can be used are Time Sharing Interface, File Transfer Utility, and Professional Work Station.
- Mainframes access EDI Express using 2780/3780 protocols for High Speed Service.

- Dumb terminals can extract reports but cannot do transactions.

3. IBM - INFORMATION NETWORK (IN)

- The Ad/TRACS software tool is available within Product Information Exchange store and forward services on the network for EDI applications.

- Users define conversions required; Ad/TRACS handles those conversions and provides various subroutines such as calculations.

- IN's backbone is SNA and is most suitable for IBM mainframe users. The network itself handles various protocol conversions.

- Although limited to a few access cities, off-net support is provided through arrangements with GTE Telenet.

4. MCDONNELL DOUGLAS CORPORATION - EDI NET

- This service uses TDCC and UCS standards for EDI applications to the grocery, transportation, and electronics industries using the Tymnet packet network with access points in approximately 600 locations worldwide.

B. EDI SERVICE BUREAUS

1. INFORMATICS GENERAL

- Informatics General is the world's fifth largest independent software and services firm, developing and marketing software, professional services, and information processing services.

- The company's EDI offerings to various industries are available through the Ordernet service.

- Purchase order transmission services have been endorsed by 11 trade associations.

2. KLEINSCHMIDT

- This subsidiary of SCM Corporation provides EDI mailbox services to various industries but is focused on the rail and trucking segments.

- The service does not use industry standards but requires users to provide data mapping and set up translations.

- Asynch and synch communications protocols are supported through direct dial-up, 800-number service, or out-call. Access through Tymnet is also possible.

3. RAILINC CORPORATION

- This data processing subsidiary of the Association of American Railroads operates TeleRail Automated Information Network (TRAIN II) consisting of dedicated lines, dial circuits, and satellite communications to the primary computers of the major railroads.

- The two principal EDI products are SAM (Shipper Assist Message Service) for high volume needs and CARLO (Car Location Message Dial-In Service) for low-volume needs.

- Direct, full-time 2,400-4,800 bps, bisynchronous (3780) protocol connections are supported for information transfers for SAM, and toll-free dial-in service is used for CARLO. CARLO is a store and forward mailbox service.

- Microcomputer communications software is available for IBM PCs and compatibles.

4. TRANSETTLEMENTS, INC.

- This service bureau's EDI services are targeted primarily to motor transportation segment companies, although it has customers in other transportation segments and is seeking to broaden its customer base.

- Communications between third-party services and intermodal carriers (e.g., companies providing a combination of rail, motor, air, or ocean transportation) are done using Control Data Corporation's NTS. Links are being established to Kleinschmidt, which primarily services the rail industry.

- Inbound and out-dial services are supported at 4,800 baud, using IBM 3780 protocols, directly or through WATS/800 numbers.

- Per transaction costs for volume users (over 3,000 transactions monthly) range between $0.12 and $0.16, including monthly fees and communications costs.

- Freight bills, bills of lading, and remittance notices which can be sent directly to payment centers are supported.

- The company also provides software consulting and customization. Its mainframe Set Generator and Set Integrator software is sold for approximately $20,000.

C. EDI SOFTWARE

1. APL GROUP

- ACDI is a modular micro-based software package which front-ends a customer's host computer for EDI.

- ACDI provides 17 functions for document validation and acknowledgement, data cross referencing, data base maintenance, and error detection/correction.

- Base license fees vary between $4,000 and $6,000 depending on configuration. A tutorial is prices at $700. Customization to a client's mainframe is negotiable.

- Bysynch and asynch communications are supported.

2. METRO MARK INTEGRATED SYSTEMS

- The company's Translator* series of software supports TDCC and X.12 standards for IBM mini and microcomputers.

- Translator*34 for the IBM S/34 is priced at $5,000, with maintenance priced at $600 per year after the first year.

- Translator*36 for the IBM S/36 costs $6,000, with $600 for maintenance per year.

- Translator*38 for the IBM S/38 is $6,000, and $720 annually.

- Translator*XT and AT for IBM XTs, ATs, and compatibles costs $1,995, and $399 per year.

3. PROGRAM SCIENCE INCORPORATED

- This Ridgefield (CT) company offers a computer assisted instruction course on EDI, and markets X-Change EDI micro software for IBM PCs and compatibles.

- X-Change is a menu-driven system which handles purchase orders, acknowledgements, and invoices, translating between standard formats and X.12 standards.

  - It supports asynchronous communications without modification but will handle bisynchronous links with the optional addition of file import and export facilities.

  - It is priced at $2,500.

- The CAI products, called Redi-Set-Go! can be used as a guide to developing in-house EDI software, and modules are suitable for executive level presentations on the benefits and functions of EDI. It is priced at $495 and includes two hours of telephone support.

4. TDCC

- TDCC software is available for mainframes, minis, and micros, and is usually supplied in tape form for larger processors.

- The table-driven software includes a set generator and interpreter as well as an editor.

- Users need to complete installation based on their system's requirements, and TDCC-sponsored classes provide guidance.

- TDCC software is priced at $750 per year for TDCC members and $2,000 per year for non-members.

APPENDIX C: ELECTRONIC DATA INTERCHANGE USER QUESTIONNAIRE

APPENDIX C

Electronic Data Interchange

User Questionanaire

INPUT is preparing a study on electronic information interchange, primarily covering things such as the electronic exchange of purchase orders, on line ordering sytems, and some aspects of electronic mail systems.

I would like to ask you a few questions about this field to find out about your activities, your plans, and awareness of some of the things going into electronic information interchange. The interview will take approximately 15 or 20 minutes, and I think you'll find it interesting. In exchange for your help on the study, I will send you a summary of our findings for your files.

Is now a good time?

The first set of questions involves ELECTRONIC DATA INTERCHANGE or EDI. EDI is used by companies to exchange electronic purchase orders, invoices, and the like even though they may be using differently formatted paper forms and different computers. The information can be directly entered into a company's data processing system.

EDI has been primarily used by the transportation industry, and now by retail distributors and a few other industry segments.

1. The first question is: HAVE YOU EVER HEARD OF EDI BY NAME? Y/N

2. On a scale of 1-5, with five being high awareness, how would you RATE YOUR PERSONAL KNOWLEDGE OF EDI? 1 2 3 4 5

3. Next, I would like to know IF YOU NOW USING, or PLANNING TO USE EDI. Y/N Specifically could you tell me if you are

___JUST BEGINNING to look at it

___PLANNING an EDI project

___IMPLEMENTING an EDI project

___CURRENTLY USING EDI or if you

___Have NO CURRENT PLANS to use it.

4. Can you DESCRIBE YOUR ACTIVITIES, or the reasons for not looking into EDI?

5. Can you ESTIMATE WHEN, IF EVER, YOU WOULD START IMPLEMENTING EDI?

6. (ONLY IF RESPONDENT HAS EDI NOW) WOULD YOU DESCRIBE YOUR CURRENT EDI SYSTEM AS A:

___A PRIVATE NETWORK USED BY A FEW COMPANIES?

___AN OPEN SYSTEM WHICH USES A VAN?

___AN OPEN SYSTEM WHICH USES A PRIVATE NETWORK?

7. Does your company have any sort of AUTOMATED, ON-LINE ORDER ENTRY, INVOICING OR ORDER INQUIRY SYSTEM which your customers or suppliers can access? Y/N

a. (If NO ask:) Are you planning any type of system like this?

b. (If YES ask:) Could you please DESCRIBE it.

8. a. If you are planning to install EDI, or if you now have such a system, will you/did you WRITE THE SOFTWARE youself or will/did you PURCHASE it?

b. Why did you take this approach?

c. If you purchased software, what vendor and what product did you choose?

d. If you plan to or have written the software yourself, would you EXPECT TO SELL THAT SOFTWARE TO OTHER COMPANIES?

e. What about OFFERING THE SOFTWARE TO COMPETITIVE firms?

f. On a scale of 1 to 5, with 5 being most likely, how likely would it be that you would purchase a TURNKEY SYSTEM of both hardware and software for your EDI system? 1 2 3 4 5
Why this rating?

g. On the same scale of 1-5, how likely would it be that you would contract with a CONSULTANT OR PROFESSIONAL SERVICES FIRM to manage the implementation of your EDI system? 1 2 3 4 5
Again, why this rating?

9. What do you think are THE PRIMARY BENEFITS of such a system?

10. Are you looking, or would you look for HELP FROM AN INDUSTRY ASSOCIATION? Y/N What associations?

11. Let's assume for a minute that you are planning or are now operating an EDI system which links you, one way or another, to you customers and suppliers.

Which of the following would prefer:

OPERATE THE SYSTEM YOURSELF? [ ]

RELY ON A THIRD PARTY SERVICE BUREAU TO MANAGE THE SYSTEM? [ ]

RELY ON ANOTHER COMPANY TO MANAGE THE SYSTEM? [ ]

12. a. If you installed EDI, do you think you would need to ADD MEMORY TO YOUR COMPUTERS? Y/N

b. If YES, WHAT PERCENTAGE INCREASE do you estimate you would require? _____%

c. What about ADDITIONAL PROCESSING CAPACITY? Y/N

d. If YES, WHAT PERCENTAGE INCREASE do you estimate you will require? _____%

13. a. What kinds of PROBLEMS do you need to consider regarding an EDI system, as we have been discussing?

b. Let me read you a list of issues and problems which we believe

people may be concerned about, and ask you for a rating, again on a 1-5 scale, with "5" being "a serious concern" and 1 being "not a serious concern" and get your reaction:

How much of a concern are:

The actions of your COMPETITORS with regards to an EDI type system	1	2	3	4	5
Concerns about the ENTIRE SYSTEM, including hardware and software which you may install	1	2	3	4	5
Network/Data SECURITY	1	2	3	4	5
Software MAINTENANCE	1	2	3	4	5
INTERNATIONAL EDI capabilities, that is, the ability to do business with people in other countries	1	2	3	4	5
Changing BUSINESS PRACTICES, for example managing the change from paper forms to electronic forms	1	2	3	4	5
RELIANCE on ONE VENDOR or Service	1	2	3	4	5
EDI STANDARDS and COMPATIBILITY	1	2	3	4	5

14. Could you please tell me what VAN (or VANs) your company uses, if any?

15. EDI services are provided by value added networks (VANS). Did you know this? Y/N

16. Could you give me an estimate as to the number of transactions which your company handles, either paper or electronically for these types of transactions:

	PAPER	ELECTRONIC
Invoices		
Incoming Purchase Orders		
Outgoing Purchase Orders		
Shipping Bills of Lading		
OTHERS_____		
_____		
_____		

17. Have you done any analysis of the cost, on a per-transaction basis, of your PAPER BASED systems for purchase order processing, invoicing, or other routine paperwork of this nature? (If yes: What did you find out?)

18. Have you done any analysis of the cost, on a per transaction basis, of any ELECTRONIC METHODS you may now be using to process the information which was formerly handled with paper? (If YES: What did you find out?)

19. a. What, in your estimation, would be a reasonable PER-TRANSACTION COST which would make converting to electronic systems worthwhile? (probe for range) $_____.

b. What about START-UP COSTS? $_____

Thank you. I have just a few more questions.

20. Next, I would like to ask you if, to the best of your knowledge, your company is now using or planning to use the following communications systems. If you are planning to use the system named, could you also estimate when it will be operational.

The first one is:

	use	plan to use(when)
Internal Electronic Mail		
External Electronic Mail		

through a
___ VAN or an
___External Service
or ___a private network

How About an
Electronic Mail Service using
pre-formatted on-line forms such
as order blanks

21. Next I would like to ask you if you are aware of the following types of information tools. I would like you to rate your awareness on a scale of 1-5, with 5 being "I know quite a bit about that" and 1 being "I've never heard of that". A rating of three would be "I am somewhat aware of the tool."

The first one is

Teletex - a form of Electronic Mail.	1	2	3	4	5
The X.400 standard as related to Electronic Mail	1	2	3	4	5
A New error correcting communications protocol: MNP	1	2	3	4	5
Another protocol: X.PC	1	2	3	4	5
Using an FM Radio Subcarrier as a distribution method	1	2	3	4	5

22.a. Finally, as you know, many business relationships are hinged on personal elements, the rapport or familiarity that people develop over time which helps, or hinders, doing business. Could you tell me your thoughts about how you see Electronic Data Interchange, as we have been using that term, being accepted or rejected due to personal relationships?

(PROMPT IF NECESSARY:) FOR EXAMPLE, you may be doing business with certain companies because of these personal factors... your people know people at another company. With EDI, assuming it is an open system using a VAN or an open private network, people could do business based on, for example, who offers the best price, regardless of any personal relationships. Any comments?

_____

_____

_____
_____
_____

b. A little more about these human factors (and we're just about finished). Often, prices of goods and services are flexible. Some suppliers may give you better prices on goods than they give others. How do you imagine an EDI system would affect this?

_____
_____
_____

c. Are there any other "people factors" or business practices which would affect the use of EDI at your company?

_____
_____
_____
_____

THAT CONCLUDES OUR FORMAL INTERVIEW. Is there anything else you think we should consider in our report on electronic data interchange?

Thank you very much for your help. Your comments are appreciated, and will make our report most informative and valuable. We should have the executive summary out to you within 6-8 weeks. Thanks again.

APPENDIX D: ELECTRONIC DATA INTERCHANGE VENDOR (VAN) QUESTIONNAIRE

APPENDIX D

Electronic Data Interchange

VENDOR (VAN) QUESTIONNAIRE

INPUT is preparing a study on electronic data interchange (EDI), and some relevant aspects of electronic mail systems. The analysis will identify opportunities and potential problems for VANs. Next year, we'll be doing an EDI user's guide.

I would like to ask you a few questions about this field to get your perspectives on some issues, find out about your company's activities, and to verify some information. The interview will take approximately 15 minutes, and I think you'll find it interesting. In exchange for your help, I'll be sending you a summary of our findings for your files.

Is now a good time?

1. Could we verify your company's offerings relevant to EDI? [note to interviewer: Review service profile with subject, and note exceptions here.]

2. What types of documents are supported?

3. What industries are your specifically targetting?

4. Have you adopted the published standards of any of the organizations involved in EDI? Which ones?

5. Could you describe for me how you have worked with industry associations or ad hoc groups in designing and selling your service?

6. Was your software written by any of the other companies involved in EDI?

7. What do you see are the advantages of a mailbox EDI system?

9. a. Does your electronic mail service have any EDI-like features, such as a customized form capability for "fill-in-the-blanks" usage?

b. Is your electronic mail service linked in any way to EDI services?

10. How can low volume users take advantage of EDI services using your network?

11. Why should any customer (large or small) use a VAN for EDI services rather than set up their own network, using their own software?

12. How can your company keep your current customers from migrating to their own private network for EDI?

13. We've heard some users say they were concerned about turning over their business transactions and records to a third party because they were afraid their competitors might somehow get into their files. Is data security a problem, and if not, how do you deal with this concern?

14. Our report will size the market, determine current marketshares of participating companies, and do a forecast based on information coming from several sources. Can you tell me the following:

a. The number of EDI transactions on your network?

b. The estimated percentage of all transactions that EDI represents?

c. Actual revenue for EDI services? or

d. Estimated percentage of network revenue which EDI represents?

15. Have you done any internal forecasting regarding the growth of EDI services either generally or as this growth will affect your network?

16. Who do you see as your leading competitors for EDI network services?

17. What would you estimate to be your market share of EDI services? What about your rivals? (If not market share, how about a ranking.)

18. What about proprietary networks. How do you think they figure into the overall EDI marketplace, by percentage?

19. Is there any information on the average transaction costs charged to the user? A range will do.

20. Control Data Corporation has proposed to serve as a clearinghouse for EDI networks. What is your perspective on this proposal?

21. Does your EDI services work for multinational communications? Are there any special political, technical, or other problems with regards to international EDI?

22. It appears that one of the missing pieces in EDI are the banks for electronic funds transfer tied to EDI transactions.

a. Is your company working to complete the EDI loop in this regard?

b. What are the problems?

22. How do you see EDI progressing? What's in the future for EDI?

THIS CONCLUDES OUR INTERVIEW. IS THERE ANYTHING ELSE WE SHOULD BE CONSIDERING WITH REGARDS TO EDI IN OUR REPORT?

THANKS AGAIN FOR YOUR COOPERATION. WE SHOULD HAVE THE SUMMARY OF THE REPORT OUT TO YOU IN ABOUT 6 WEEKS.

APPENDIX E: ELECTRONIC DATA INTERCHANGE VENDOR (SOFTWARE) QUESTIONNAIRE

APPENDIX E

Electronic Data Interchange

VENDOR (Software) QUESTIONNAIRE

INPUT is preparing a study on electronic data interchange (EDI), and some relevant aspects of electronic mail systems. The analysis will identify opportunities and potential problems for EDI software providers. Next year, we'll be doing an EDI user's guide.

I would like to ask you a few questions about this field to get your perspectives on some issues, find out about your company's activities, and to verify some information. The interview will take approximately 15 minutes, and I think you'll find it interesting. In exchange for your help, I'll be sending you a summary of our findings for your files. Is now a good time?

1. Could we verify your company's EDI software offerings and their current prices?
[note to interviewer: Review product profile with subject, and note exceptions here.]

2. What types of documents are supported?

3. Does your software handle the communications required?

4. Does your software provide a facility for generating internal reports?

5. Does your software provide for any E-mail functions?

6. What industries are your specifically targetting?

7. Does your software use the published standards of any of the

organizations involved in EDI? Which ones?

8. As you know, the TDCC offers EDI software at a fairly low price. Why would a company buy your product rather than use theirs?

9. Could you describe for me how you have worked with industry associations or ad hoc groups in designing and selling your software?

10. What hardware does your software operate on?

11. Do you have, or are you planning any alliances with hardware companies to offer a turnkey EDI system?

12. How about alliances with any of the VANs, or with a network operator?

13. Why should a customer (large or small) use your software for EDI services rather than use a VAN service?

14. How can a software company such as yours keep its current customers from migrating to a VAN EDI?

15. Our report will size the market, determine current marketshares of participating companies and do a forecast based on information coming from several sources. Can you tell me the following:

a. The number of installations for your software?

b. Your annual revenue for EDI software, broken down by sales and

licensing fees?

16. Have you done any internal forecasting regarding the growth of EDI either generally, or as this growth will affect your products?

17. Who do you see as your leading competitors in EDI software?

18. What would you estimate to be your market share for EDI software? What about your rivals? (If not market share, how about a ranking.) Also, what do you estimate to be the market share or ranking for TDCC's software? UCS's software?

19. What about VANS. How do you think they figure into the overall EDI marketplace, by percentage?

20. It appears that one of the missing pieces in EDI are the banks for electronic funds transfer tied to EDI transactions.

a. Is your company working to complete the EDI loop in this regard?

b. What are the problems?

21. How do you see EDI progressing? What's in the future for EDI?

THIS CONCLUDES OUR INTERVIEW. IS THERE ANYTHING ELSE WE SHOULD BE CONSIDERING WITH REGARDS TO EDI IN OUR REPORT?

THANKS AGAIN FOR YOUR COOPERATION. WE SHOULD HAVE THE SUMMARY OF THE REPORT OUT TO YOU IN ABOUT 6 WEEKS.